

**"BEST NEW COMPUTER MAGAZINE OF 1993"**

Computer Press Association

JUNE 1994, VOLUME II, NUMBER 6  
OS/2 FOR CORPORATE AMERICA

# OS/2

PROFESSIONAL

## Building YOUR OWN

*How to create your  
OS/2 dream machine*

*by Bradley D. Klierer*

**CHIP WARS  
Revisited**

\$4.95 U.S.  
\$5.95 Canada





**THERE'S SOMETHING**

# EXPR

THE QUICKEST WAY TO ORDER OS/2 APPLICATIONS, TOOLS, BOOKS, AND

## Special June Values!

### Guild UIMS

MSR: \$895

**OS/2 EXPRESS PRICE:  
\$350**

**ORDER NUMBER 122**

### OHS/Tools

MSR: \$69.95

**OS/2 EXPRESS PRICE:  
\$20**

**ORDER NUMBER 158**

**While  
Supplies Last!**

#### Tritus SPF

Tritus

Tritus SPF is a 32-bit ISPF/PDF text editor for OS/2. Includes mappable keyboard, unlimited UNDO/REDO, REXX macros, EBCDIC support, Micro Focus Workbench integration, modifiable panels, cut/paste, text search, and DOS support. Edits files up to 256mb.

**Order number 167**

MSR: \$195    **Our Price: \$95** (until July 8)

**NEW!**

#### Pegasus Resource Monitor

OnDemand Technology

The first affordable, professional performance monitor for OS/2 version 2.x. Features: statistical data logging, pop up, exceptions, and a real time graphical display

**Order number 168**

MSR: \$149    **Our Price: \$99**

**NEW!**

#### VisPro/REXX

HockWare

VisPro/REXX takes the power of OS/2, Workplace Shell, and the REXX language and harnesses them into an easy-to-use visual programming environment.

VisPro/REXX, Bronze Edition

**Order number 169**

MSR: \$99    **Our Price: \$89**

VisPro/REXX, Gold Edition

**Order number 170**

MSR: \$299    **Our Price: \$225**

**NEW!**

#### ◆ OS/2

### GREAT VALUE!

#### OS/2 for Windows

IBM

Move any windows desktop to a higher level with OS/2 for Windows. All the power of OS/2 but completely Windows.

**Order number 164**

MSR: \$134.00

**Our Price: \$49.00**

#### ◆ BACKUP

#### BackMaster 1.01 for OS/2

MSR Development

BackMaster is a 32-bit backup program that supports most popular QIC 40/80 tape drives. It includes a set of disaster recovery utilities for quick recovery from system crashes.

**Order number 129**

MSR: \$79.95

**Our Price: \$59.95**

#### NovaBack for OS/2

NovaStor

NovaBack for OS/2 is a complete backup solution for all OS/2 workstations or networks. Support for OS/2 1.x and 2.x is shipped together. NovaBack supports more than 250 SCSI and QIC-80 tape drives.

**Order number 138**

MSR: \$145.00

**Our Price: \$79.99**

**TO ORDER, CALL 1-800-OS2-KWIK (1-800-672-5945) •**



NEW EVERY MONTH IN...

# ESS

ACCESSORIES. 1-800-OS2-KWIK



Order number 163

\$25.00

## ◆ UTILITIES

### CPU Monitor Plus

Bon Ami Software Corp.

A premium performance and analysis package for OS/2. CPU Monitor Plus permits real time monitoring and control of CPU, RAM, disks and ports, and program and thread control for all OS/2, DOS, and Windows programs.

Order number 108

MSR: \$129.95

Our Price: **\$79.95**

### CursorPower

North Shore Systems

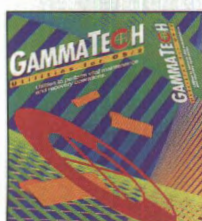
Redesign and resize arrow, wait, I-beam, and other cursors. Create new cursors or turn graphics, text, signatures, and company logos into cursors. Toolkit includes OS/2 and Windows versions on one disk.

Order Number: 153

MSR: \$49.95

Our Price: **\$35.00**

### GammaTech Utilities for OS/2



SofTouch Systems  
GammaTech Utilities for OS/2 makes it possible to perform HPFS volume recovery, FAT and HPFS optimization, and essential maintenance operations easily and without

extensive technical knowledge.

Order number 109

MSR: \$149.00

Our Price: **\$119.00**

### GammaTech Power Pack for OS/2

SofTouch Systems, Inc.

Increase user productivity by defining hot

key sequences to access high-priority applications. Power Pack includes a file editor for OS/2 \*.INI and extended attributes files. A screen saver is also included.

Order number 110

MSR: \$69.95

Our Price: **\$59.95**

### GammaTech File Secure for OS/2

SofTouch Systems, Inc.

File Secure for OS/2 provides a high degree of file-level security by encrypting data using U.S. Data Encryption Standard\* algorithms. Options include file obliteration meeting Department of Defense 5220.22-M specifications. (\*Not for sale, re-sale, or use outside the U.S. and Canada.)

Order number 111

MSR: \$39.95

Our Price: **\$34.95**

### J&J Utilities for OS/2

J&J Computer Consulting

J&J Utilities is a collection of 12 key utilities including file locate, text search, HPFS and FAT file defragmenters, and job control.

Order number 112

MSR: \$34.95

Our Price: **\$29.95**

### OS2Tree Lite

Levine

OS2TREE Lite is what XTREE Gold is to DOS, what Norton Commander missed, and more. Dynamic graphic file management for OS/2 supporting both FAT and HPFS.

Order number 141

MSR: \$125.00

Our Price: **\$65.00**

### OS2Tree Pro

Levine

All the features of OS2TREE Lite plus

LAN drive, mainframe file upload/download support, and one year of upgrades and product support.

Order number 142

MSR: \$250.00

Our Price: **\$129.00**

### Performance 2.1 Plus

Clear & Simple, Inc.

Optimize your system with the help of this collection of 25 OS/2 REXX Workplace Shell utilities plus a 100-page manual on finetuning OS/2 2.1. Also includes a bonus of 3,000+ OS/2 format Icons.

Order number 115

MSR: \$39.95

Our Price: **\$24.95**

### Priority Master I

ScheduPerformance, Inc.

Priority Master I is designed to give the user control over the entire OS/2 environment. View, set and print priorities, set alarms for CPU usage, and more.

Order number 143

MSR: \$99.00

Our Price: **\$39.00**

### Priority Master II

ScheduPerformance, Inc.

Designed for OS/2 developers, Priority Master II adds to Priority Master I additional auto priority scanning logic. Take control of your development environment and how your programs co-exist.

Order number 144

MSR: \$129.00

Our Price: **\$49.00**

### PrntScrn

MITNOR Software

4 Integrated Utilities—1 Price! Copy any portion of any desktop image; import,

TO ORDER, CALL 1-800-OS2-KWIK (1-800-672-5945)



export, view, print clipboard images and text; nine screen saver displays; date/time display. LAN installable; includes OS/2 2.x and 1.3 versions.

**Order Number: 154** *MSR: \$115.00*  
*Our Price: \$105.00*

### Secure Workplace for OS/2

Syntegration

The Secure Workplace for OS/2 is a collection of workplace objects and program utilities designed to provide workplace shell protection, setup, and support.

**NEW!**

**Order number 165**  
*MSR: \$59.95*  
*Our Price: \$49.95*

10 Station Enterprise Edition:  
**Order number 166**  
*MSR: \$549.95* *Our Price: \$399.95*

### ◆ CD-ROM

### BEST BUY!

#### OS/2 Professional CD-ROM

More than 1,200 OS/2 shareware, freeware, demoware programs, tools, and scores of important OS/2 resources.

**Order number 163**  
*Our Price: \$25.00*



### ◆ COMMUNICATIONS

#### Fax/PM



Microformatic/American TeleRep, Inc.  
Fax/PM is the award-winning object oriented fax software for OS/2 and OS/2 for Windows. Use this 32-bit, multi-threaded, multitasking

Workplace Shell savvy-software to send and receive faxes from any desktop machine.

**Order number 101** *MSR: \$150.00*  
*Our Price: \$102.00*

#### FaxWorks for OS/2

SofNet, Inc.  
FaxWorks OS/2 enables faxing from any

OS/2, Windows, or DOS application via a Class 1, Class 2, or CAS fax modem. The software also includes annotation tools to allow electronic markups, fax broadcasting, and multiple channel options.

**Order number 102** *MSR: \$149.00*  
*Our Price: \$99.00*

10-user LAN version

**Order number 103** *MSR: \$699.00*  
*Our Price: \$495.00*

#### FaxWorks Pro

SofNet, Inc.

Award-winning FaxWorks Pro for Windows features advanced viewing clarity, extensive fax management tools, fax annotation, a cover sheet creator, modem diagnostics, letterhead merge, and more importantly, it's easy to use.

**Order number 104** *MSR: \$129.00*  
*Our Price: \$65.00*

#### HyperACCESS/5 V3.1

Hilgraeve

Award-winning async comm program includes virus protection, remote control, on-the-fly un-zipping, 12 fast file transfer protocols, 17 terminal emulations. *PC Magazine* Editor's Choice.

**Order Number: 161** *MSR: \$199.00*  
*Our Price: \$129.00*

#### KopyKat V1.0

Hilgraeve

Anything you can do on an OS/2 PC, you can now do remotely through a modem or over a LAN. Displays the entire remote desktop in a window on your desktop.

**Order Number: 162** *MSR: \$199.00*  
*Our Price: \$129.00*

#### PMCOMM 2.11

Multi-Net Communications

PMCOMM is a full-functioned, 32-bit, multithreaded PM communications program that's a pleasure to install and use. It supports internal and REXX scripting and offers a ready-to-use host mode.

**Order number 105** *MSR: \$99.95*  
*Our Price: \$89.95*

#### PM2YOU

Ridax

Control your OS/2 Desktop and Presentation Manager or character mode programs remotely from another OS/2 or Windows machine via dial-up modems, NetBIOS, APPC, TCP/IP, SPX, or Named Pipes.

**Order number 140** *MSR: \$255.00*  
*Our Price: \$199.00*

#### TE/2 1.30

Oberon Software

TE/2 is a full-featured OS/2 telecommunications and terminal emulation package. It supports ANSI, VT100, IBM3101, and TTY emulations, and most common file transfer protocols.

**Order number 107** *MSR: \$99.95*  
*Our Price: \$79.95*

### ◆ PRODUCTIVITY

#### Applause

Solution Technology

Twain-enabled image utility for OS/2 2.x. Allows the user to view scanned images on-screen and cut and paste them into other applications, as well as rotate, invert, and scale images for fax transmission.

Applause for HP

**Order Number: 159** *MSR: \$199.00*  
*Our Price: \$179.00*

Applause for Logitech

**Order Number: 160** *MSR: \$149*  
*Our Price: \$129.00*

#### Footprint Works for OS/2

Footprint Software Inc.

Footprint Works for OS/2 is a native 32 bit works application that combines word processing, spreadsheets, charts, database and a report writer to provide a complete range of personal productivity.

**Order Number: 157** *MSR: \$149.00*  
*Our Price: \$95.00*

#### OHS/Tools

Orange Hill Software

Launch any program from a master menu (a must for notebooks), apply any of 450 icons to your apps, files and documents, use customized folder templates and texture bitmaps, restore an "arranged" desktop, create your own icon library.

**Order Number: 158** *MSR: \$ 69.95*  
*Our Price: \$20.00*

#### Power Translator Professional for OS/2

Globalink, Inc.

This powerful application provides idiomatically accurate full-sentence foreign language translations under OS/2. Get the most accurate translations with subject-, industry- or profession-specific dictionaries.

**TO ORDER, CALL 1-800-OS2-KWIK (1-800-672-5945)**



Versions are available translating to and from Spanish, French, or German.

**Order number 116** *MSR: \$1,195.00*  
*Our Price: \$399.00*

### DipWriter

TopDesk Software  
Using Dip Writer, quickly and easily develop an install or customization procedure for an OS/2, DOS, or Windows application.

**Order number 121** *MSR: \$69.00*  
*Our Price: \$59.00*

## ◆ MULTI-MEDIA

### MIDI Renderer

Diacoustics  
Good-bye, FM synthesis! MIDI Renderer, a user-modifiable software synthesizer, produces CD-quality digital .wav files from MIDI music files. Uses existing audio card. OS/2, Windows, and DOS on CD-ROM.

**Order Number: 155** *MSR: \$129.95*  
*Our Price: \$69.95*

## ◆ GRAPHICS

### GREAT VALUE!

#### CorelDRAW! 2.5 for OS/2 2.0

Corel Corporation  
One 32-bit illustration package does it all: CorelDRAW!, CorelCHART, and CorelPHOTO-PAINT in one box, all optimized for OS/2. Plus a bonus CD-ROM with more than 12,000 clip art images and 250 fonts.

**Order number 100** *MSR: \$199*  
*Our Price: \$149.00*



## ◆ DEVELOPMENT TOOLS

### CEnv! for OS/2

Nombas  
A scripting tool to enhance or replace batch/REXX programming. Automate any session. Exploit 150 internal functions and the OS/2 API. Includes hundreds of samples and utilities.

**Order Number: 156** *MSR: \$45.00*  
*Our Price: \$39.00*

### Error Manager 2.0

Soft & GUI Corporation  
Error Manager is an OS/2 2.x development tool kit that provides unique testing and debugging facilities. It eliminates the need to check API Return codes, and no symbol information is required.

**Order number 117** *MSR: \$225.00*  
*Our Price: \$199.00*

### GpfRexx

Gpf Systems, Inc.  
A WYSIWYG OS/2 PM visual programming tool that uses REXX. Point and click to create basic or advanced applications using OS/2's capabilities. No royalties will be owed; configurable run-time capability.

**Order number 118** *MSR: \$247.50*  
*Our Price: \$225.00*

### Guild UIMS

Guild Products, Inc.  
Guild UIMS is a visual environment for the development of graphical user interfaces for OS/2 by C/C++ programmers. The resulting GUI can be ported to Windows and Macintosh by a simple recompile.

**Order number 122** *MSR: \$895.00*  
*Our Price: \$350.00*

### Objectpm

Raleigh Systems, Inc.  
The first class library geared specifically for OS/2 and the Presentation Manager, Objectpm provides more than 200 classes of objects encapsulating windows, controls, graphics tools, forms, threads, and much more. Supports Borland C++ for OS/2 and IBM CSet++.

**Order number 119**  
*MSR: Object version: \$235.00*  
*Our Price: \$199.00*

**Order number 151**  
*MSR: w/source: \$399.00*  
*Our Price: \$349.00*

### REXX Diagnostic Commander

Suitable Alternatives  
REXX Diagnostic Commander is a source level, interactive REXX debugging tool. Set breakpoints, single-step instructions, Jump or Run to any instruction. Windows allow variables, monitoring, and alteration.

**Order number 139** *MSR: \$150.00*  
*Our Price: \$125.00*

## ◆ DATABASE

### SQL Objects++ Database Library

Objects ++ Software Corporation  
A powerful collection of C/C++ APIs and methods that provide a common programming interface to Oracle, Sybase, SQL Server, DB2/2, DDCS/2, SQL Base, Btrieve, NetWare SQL, and others. It supports OS/2 (32-bit), Windows, DOS, NT, and Unix.

**Order number 120** *MSR: \$495.00*  
*Our Price: \$349.00*

### SQL Processor/2 StandAlone

Millenium Technologies, Inc.  
Using this rich set of APIs, your 16- or 32-bit applications can dynamically access multiple databases simultaneously. Group multiple SQL updates within a single commit or rollback. Networked versions available.

**Order Number: 152** *MSR: \$995.00*  
*Our Price: \$895.00*

## ◆ NETWORKING

### CorelSCSI

Corel Corporation  
With CorelSCSI you can daisy chain up to seven disk, CD-ROM, WORM, and other SCSI drives to maximize the power of your desktop OS/2 machines.

**Order number 123** *MSR: \$129*  
*Our Price: \$99.00*

### Desktop Observatory

Pinnacle Technology, Inc.  
Remotely configure and password-protect desktops. Prevent deletes, copies, moves, dragging, shadows, or renames, or hide objects from view. Launch your own C or REXX routines on any network client, based on event.

**Order number 124** *MSR: \$179.00*  
*Our Price: \$149.00*

### TCP/2-OS/2 Distribution System

Essex Systems, Inc.  
This product provides TCP/IP connectivity for OS/2. It supports all released versions of OS/2 and NDIS, CM, and ODI drivers. TCP/2 provides network access from protected, real, and WIN-OS2 sessions, and offers IP Gateway capability.

**Order number 125** *MSR: \$475*  
*Our Price: \$399.00*

•• TO ORDER, CALL 1-800-OS2-KWIK (1-800-672-5945)



### RightFAX 3.5

RightFAX

RightFAX 3.5, scalable to any size network, takes advantage of the power and speed of the OS/2 environment, while its DOS and Windows client software allows users access to the fax server capabilities across different platforms.

Order number 126

*Call for Pricing*

### ◆ RAID SOFTWARE

#### EZRAID for OS/2

PRO Engineering, Inc.

This software RAID solution supports RAID Levels 0, 1, 4, and 5. It works with SCSI, ESDI, and IDE disk interfaces and includes powerful array management tools.

Order number 127 *MSR: \$795.00*

*Our Price: \$625.00*

#### Oasas I

Integra Technologies, Inc.

Oasas I is a software product that will incorporate disk drives into a RAID array under OS/2. RAID levels supported include Level 1, Level 5, and Level 0/1.

Order number 128 *MSR: \$795.00*

*Our Price: \$595.00*

### ◆ BOOKS

#### Using Workplace OS/2, Power User's Guide to IBM's New Operating System/2 Version 2.1

by Lori T. Brown and Jeff Howard  
(Van Nostrand Reinhold)

The Workplace Shell's lead designers help you convert easily and quickly from Windows and Mac environments to OS/2. Set up, maintain, and customize your desktop and power up with OS/2's Multimedia Presentation Manager/2.

Order number: 145 *MSR: \$24.95*

*Our Price: \$21.95*

#### Writing OS/2 2.1 Device Drivers In C, Second Edition/Updated and Revised

by Steven J. Mastrianni, Foreword by John Soyring (Van Nostrand Reinhold)

The update of this popular guide provides programmers and developers with the skills they need to write device drivers and get applications working. The author covers

full 32-bit OS/2 2.1 drivers and migration from version 1.x drivers.

Order number: 146 *MSR: \$39.95*

*Our Price: \$34.95*

#### The OS/2 2.1 Corporate Programmer's Handbook

by Nora Scholin, Martin Sullivan, and Robin Scragg (Van Nostrand Reinhold)

This complete guide teaches a modular approach to quick and efficient writing of software. Likely trouble spots are covered; the authors' suggestions on effective programming will save considerable time and frustration.

Order number: 147 *MSR: \$39.95*

*Our Price: \$34.95*

#### OS/2 2.1 Rexx Handbook, Basics, Applications and Tips

by Hallette German  
(Van Nostrand Reinhold)

The most thorough and useful guide yet published on the use of REXX interpreters and compilers. Includes a complete basic REXX tutorial, plus specific techniques for applications development.

Order number: 148 *MSR: \$29.95*

*Our Price: \$25.95*

#### Windows vs OS/2: The GUI-OOUI War, An Up-Close Look at Computer User Interfaces



by Theo S. Mandel  
(Van Nostrand Reinhold)

The first comprehensive guide to user interfaces. Applying software logic and cognitive psychology, the book explores graphical and object oriented user interfaces and compares OS/2's object oriented approach with the Windows GUI.

Order number: 149 *MSR: \$29.95*

*Our Price: \$25.95*

#### Client/Server Programming with OS/2 2.1, Third Edition

by Robert Orfali and Darriel Harkey  
(Van Nostrand Reinhold)

A 1000+ page virtual encyclopedia, now fully updated for 2.1. Helps programmers write better and faster applications that take advantage of the 32-bit environment. All code has been fully retested.

Order number: 150 *MSR: \$39.95*

*Our Price: \$34.95*

### ◆ OS2 PRO MERCHANDISE

#### OS/2 Professional T-Shirt

White 50% blend, with colorful OS/2 Professional logo on front. Adult size (XL) only.

Order number 130

*Price: \$12.00*

#### OS/2 Professional aprons

Durable "silver-grey" 50% blend with colorful OS/2 Professional logo. 30" long; handy double pockets, adjustable neck strap.

Order number 132

*Price: \$15.00*

#### OS/2 Professional Interchange golf shirts

Available by popular demand, 100% combed cotton, size XL only, with embroidered Palm Springs hummingbird logo. Available in aqua or coral. Please specify color.

Order number 133

*Price: \$25.00*

#### OS/2 Professional baseball cap

White cotton twill with colorful OS/2 Professional logo.

Order number 131

*Price: \$7.95*

### ◆ OS2 PRO MEDIA

#### OS/2 Professional Magazine

Save \$29.40 off the newstand price. Free Borg poster with any paid subscription.

Price: \$30 U.S.; \$45 Canada and Mexico; \$75 Overseas air.

Order number 134

#### OS/2 Professional Magazine— back issues

September '93 thru current issue, \$7.00 each. For issues prior to Sept. '93—call for price.

Order number 135

#### OS/2 Week

Weekly two-page fax newsletter with the latest breaking news about OS/2.

Subscription: \$200 U.S.; \$250 Canada; \$300 International.

Order number 136

**TO ORDER, CALL 1-800-OS2-KWIK (1-800-672-5945) •**



## PRICING

## HOW TO ORDER

**By phone:**

- ✓ Quantity, name, and order number of each product you want to order
- ✓ Your VISA or MasterCard number (including expiration date)
- ✓ A complete street address for delivery

**By fax:**

### By mail:

## SHIPPING AND RETURNS

## SPECIAL NOTICE

## SHIPPING

## ◆ ORDER FORM

[illegible]

## MAIL ORDER TO:

**FAX ORDER TO:**

**PHONE ORDER TO:**

(800) OS2-KWIK  
(800) 672-5945  
Canada/Overseas (301) 770-1643  
M-F 9AM-4PM EST

ORDERED BY: (please print clearly)

Name \_\_\_\_\_

Company \_\_\_\_\_

Street Address \_\_\_\_\_  
(UPS cannot deliver to P.O. Boxes)

City State Zip \_\_\_\_\_

## SHIP TO: (if different than 'Ordered by')

Name \_\_\_\_\_

Company \_\_\_\_\_

Street Address \_\_\_\_\_  
(UPS cannot deliver to P.O. Boxes)

City State Zip \_\_\_\_\_

**PAYMENT METHOD:** Please do not send cash

☐ Enclosed a check or money order in U.S. Funds. Checks must have your name preprinted. Returned checks are subject to a service charge for the greater of \$15 or maximum amount allowed by state law.

☐ VISA    ☐ MasterCard    Card # \_\_\_\_\_    Exp. Date \_\_\_\_\_

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

• **TO ORDER, CALL 1-800-OS2-KWIK (1-800-672-5945)**



# A Blue-Ribbon Panel Named **POWER TRANSLATOR™ PROFESSIONAL** Most Innovative Software of 1993...



## But our users are saying things that *really* make us proud.

**T**he prize: 1993 Discover Award  
for most innovative software.

The judges: John Dvorak,  
Michael Miller, Marvin  
Minsky, Esther Dyson, and  
Stewart Cheifet. Their Affilia-  
tions: PC Magazine, PC Computing,  
MacUser, Computer World, Computer Chronicles

and MIT. The winner: **POWER TRANSLATOR  
PROFESSIONAL** foreign language translation  
software, from Globalink®!



for OS/2

But our users don't think about "innovation."  
They have specific work in mind.

For Eric Vogt, translator for the American  
Red Cross, **POWER TRANSLATOR PROFESSIONAL**  
guarantees consistency and "...saves an enormous amount  
of time... A person simply can't remember 5,000 scientific  
terms and how they were translated the last time." For  
Jamila Banks, a language student at Howard University,  
"What you would normally take a day on, you can

"...it saves an enormous amount of time..."

— Eric Vogt, American Red Cross translator

"...I really expanded my vocabulary, my grammar...  
using the program has been just great."

— Jamila Banks, Howard University student

now virtually do in just minutes!"

Available for DOS, Mac-  
intosh®, OS/2®, and UNIX®.

**POWER TRANSLATOR PRO-  
FESSIONAL** features speeds up to  
100 times faster than human  
translators, easily-updated dictionaries of  
over 250,000 words and phrases, and a 90%-plus  
accuracy rate! Subject Dictionaries are also available, in-  
cluding computer, legal, business and finance.

Find out about the software package that's got Discover  
Magazine—and a lot of other people—talking. Call  
Globalink today and ask about **POWER TRANSLATOR  
PROFESSIONAL**, your ticket to worldwide communication.



**Globalink, Inc.**

9302 Lee Highway  
Fairfax, VA 22031-1208 USA  
Int'l.: 1-703-273-5600  
Fax: 1-703-273-3866

**1-800-767-0035**  
U.S. and Canada

**Incredibly accurate translations: Spanish, French or German to/from English**

Available through OS/2 EXPRESS

Circle #104



## ARTICLES

### 19 Q & A Ask the Boss

Lee Reiswig, the president of IBM's PSP division, candidly discusses the challenges he faces in making the division that markets OS/2 successful and profitable.

BY EDWIN BLACK AND BRADLEY D. KLIEWER

### 26 SPECIAL REPORT Building Your Own

In this first of a two-part series, we look at the persistent issue of adding to your company's stock of desktop PCs.

#### 1. Building the Specs

What do you tell your purchasing department you want? Is chip speed enough?

#### 2. Building the System

There are strong arguments for putting together your own computers. We did—here's how it turned out.

BY BRADLEY D. KLIEWER

## PRODUCTS & REVIEWS

### 40 EYE ON THE MARKET The Chip Wars Revisited

Pentium processor or PowerPC? While the Intel chip still has the edge, the PowerPC is emerging as the leading RISC architecture.

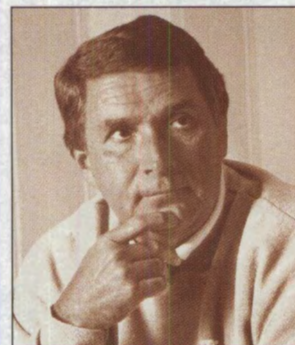
BY MICHAEL S. KOGAN

### 47 DOT EXE Bradley D. Kliewer takes a look at CA-Realizer, a programming environment built around the BASIC language, and BackupWiz, a backup system for SCSI-based tape systems or devices configured as logical drives.

### 53 HARD DRIVE A Storage Solution

PSS's line of integrated backup units may be the solution to a universal hardware backup system. Here's why.

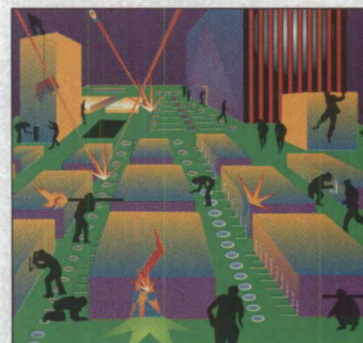
BY BRADLEY D. KLIEWER



PAGE 19



PAGE 26



PAGE 40

COVER PHOTO: VICKIE LEWIS  
DESIGN: ELIZABETH BLACK



# We Run With The Best



O/S 2, SCO UNIX, Windows, DOS and Novell. And we do it faster — up to 22MB/min for simultaneous back-up and verifying through any printer port. We also store more information, an incredible 125MB to 8GIG of data.

More importantly, all our products as well as the accompanying software are fully compatible with OS/2 and:

- Allow OS/2 to be installed from tape, saving up to 45 minutes.
- Work with OS/2 (from version 1.3), LAN Manager and LAN Server.
- Restore under “tiny” OS/2 for fast disaster recovery.

To find out how you can run with the best call 1-800-998-7839



## **PSS** PARALLEL<sup>TM</sup> STORAGE SOLUTIONS

**The Pacesetter in Parallel to SCSI Technology**

Corporate Headquarters: 116 S. Central Ave. • Elmsford, NY 10523 • 1-800-998-7839 • FAX • (914) 347-4646

Circle #113



# JUNE 1994

THE MAGAZINE FOR OS/2 PROFESSIONALS

Table of Contents—Continued

## 55 CONNECTIVITY **The View from Provo**

What does it mean that Novell's NetWare Client for OS/2 is outselling the client software for Windows NT?

BY WAYNE RASH JR.

## 59 MARKETLINE

A new, quick, and easy OS/2 installation method from PSS, Symantec's Fast-back Plus, KnowledgeNet's new communications package, and the latest news from DeScribe, Inc.

## TECH TALK

CODE CACHE *is on vacation and will return next month*

## 63 THE IS NOTEBOOK **Doing More with Less**

Tips on how to run OS/2 on a system with only 4mb of memory.

BY GORDON SCOTT AND GENE STEELE

## DEPARTMENTS & COLUMNS

## 13 INPUT

Congratulations, criticisms, and observations from our readers.

## 15 BYTES & PIECES

Controversy over the actual number of active OS/2 users, the preload perplex, and the coming explosion in the OS/2 games market.

## 17 ZACHMANN'S VIEW

It's a long race, but IBM's PowerPC is stumbling out of the starting gate.

## 65 BOOKSTAX

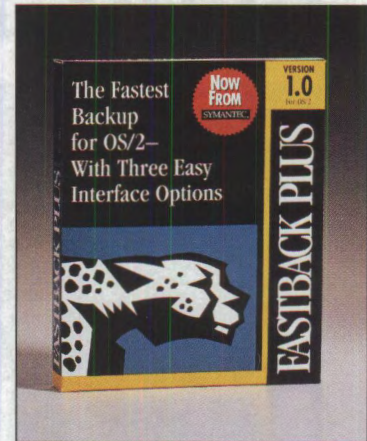
Rick Cook reviews *Mastering OS/2 REXX*, by Gabriel F. Gargiulo.

## 69 DATA DATES

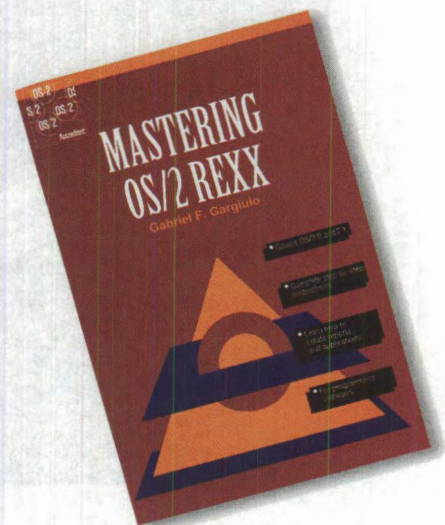
Comdex/Canada '94 in Toronto, OS/2 World Conference & Expo in Santa Clara, and OS/2 Technical Update/Networld Interop in Atlanta.

## 70 THE VIEW FROM CHAOS MANOR

Jerry Pournelle dreams of preloads.



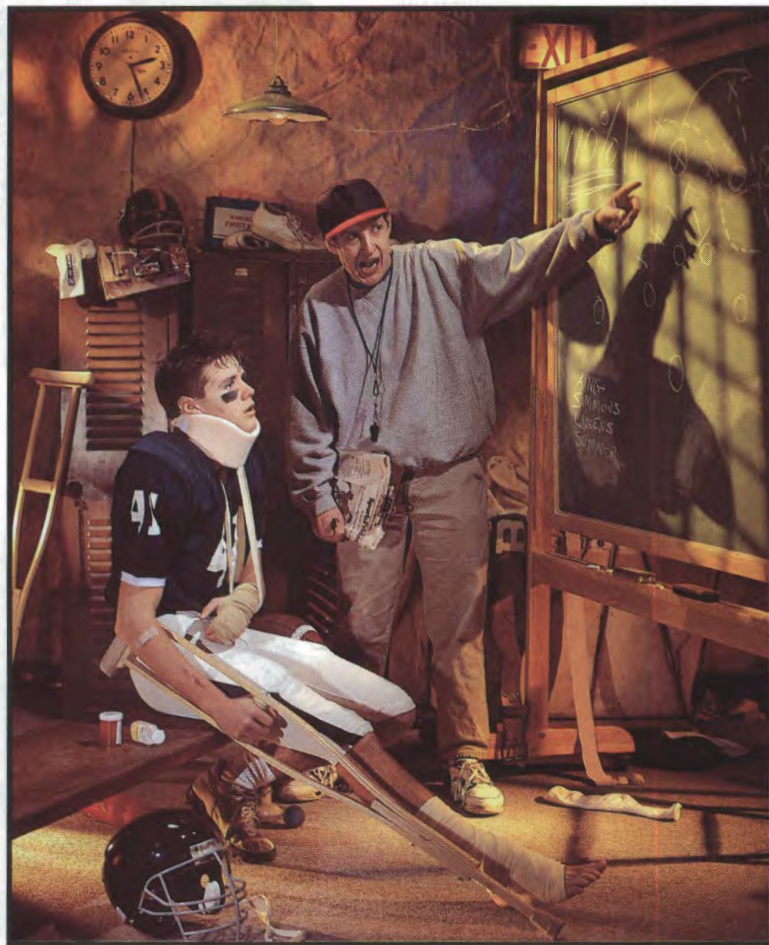
PAGE 59



PAGE 65



# BIX: Your Coach to the Internet!



The Internet connects you with more than 10 million people, at universities, companies, and other online services. Now, get full access to the Internet free of charge when you subscribe to BIX! You'll also get expert assistance from BIX moderators who can help you find your way around the Internet.

These experts can guide you through the many services and features available, and help you find the information you're looking for. Anytime you need help, just join our special 'internet' conference and get fast answers to your questions.

As you become more familiar with the Internet, you'll be able to download files from all over the world using FTP, connect to other sites and services through telnet, read and reply to Usenet Newsgroups, access utilities like finger and whois, and much more! BIX and the Internet together provide the largest and most effective technical resource for computing professionals.

And with over 600 local access numbers in the U.S., plus telnet access via the Internet, BIX makes it easy to connect. Try BIX today through our special 5 for 5 offer - and become part of the top technical team!



**Give BIX a try with our new 5 for Five Offer!** Join BIX today and get 5 hours of evening and weekend access for \$5! Take the rest of the calendar month to explore BIX, and then continue for our standard \$13 monthly membership fee. Further details and complete rate information are provided during registration. Using any communications program, dial 1-800-695-4882. At the "logon" prompt enter bix. Then at the "name?" prompt enter bix.s2pr. If you have any questions, call us at 1-800-695-4775 (voice). Or fax us at 617-491-6642. Send Internet mail to [info@bix.com](mailto:info@bix.com). Windows users can order BIXnav, our graphical interface for BIX, for easy point and click access. Details are available during registration.

Under the 5 for \$5 plan, daytime rates (\$9/hr.) apply for access during prime time hours. The 5 for \$5 offer is valid for first-time members only.

## BIX

**If you can hack it**



## How to contact OS/2 Professional

Letters to our Input section are best sent by e-mail to one of the Input addresses below. Please indicate in your e-mail where you live and how we can reach you by phone. Letters can also be submitted by fax (to 301-770-7062) or mail (addressed to *Input, OS/2 Professional*, 172 Rollins Ave., Rockville, MD 20852). Letters should be signed, on letterhead, contain your telephone number and be no longer than two-double-spaced pages. All letters, by whatever means submitted, become the property of *OS/2 Professional* and will be edited for length, content, and clarity. We cannot reply individually to Input letters.

Business, general, or technical inquiries should be addressed to the appropriate department at *OS/2 Professional*, 172 Rollins Ave., Rockville, MD 20852.

### E-mail addresses:

#### Input:

MCI Mail: 560-3615  
CompuServe: 76347,3660  
Internet: akay@bix.com

#### Bradley D. Kliever:

MCI Mail: 470-2447  
CompuServe: 70262,2724  
Internet: bkliwer@bix.com

#### Alan S. Kay:

MCI Mail: 599-8906  
CompuServe: 76347,3660  
Internet: akay@bix.com

All unsolicited materials are sent at the risk of the sender and *OS/2 Professional* assumes no responsibility for their receipt, storage, or return.

## How to subscribe to OS/2 Professional

Subscriptions for 12 monthly issues are \$30 in the United States, \$45 in Canada and Mexico, and \$75 airmail to other countries. Subscriptions may be paid by check or money order, Visa or MasterCard, or billing to a corporate address.

**BY E-MAIL.** For fastest service, subscription requests may be submitted electronically to the *OS/2 Professional* MCI mail box (560-3615 or os2pro@mci.com). Electronic requests must be preformatted using the OS2PRO.EXE program. The program and documentation are available as OS2PRO.ZIP through File Area 15 of the CompuServe OS2USER forum (GO OS2USER). The file may also be found on OS/2 BBS systems such as the OS/2 Shareware BBS at (703) 385-4325.

**By phone:** Call (301) 770-4 OS2 and use our automated telephone subscription program.

**By FAX.** Fax subscription requests w/o cover sheet on a single page to (612) 823-0151. Your request must be on corporate letterhead and include billing and/or credit card information plus a signature and title. Address your request to "New Subscriptions."

**By mail.** Send \$30 check or money order, corporate billing, or credit card information to New Subscriptions, *OS/2 Professional*, 4604 Chicago Ave. South, Minneapolis, MN 55407.

**Back issues:** Back issues are \$7 each (except issues prior to August 1993 which are priced according to supply). Order back issues by sending check or money order and specifying the issue requested. We cannot accept corporate billing or credit card charges unless the back issue request is part of a new subscription.

**Administrative, Editorial & Production Offices:** Edwin Black, Publisher and Editor-in-Chief, Alan S. Kay, Executive Editor, Margaret M. Dutcher, Assistant Publisher, 172 Rollins Ave., Rockville, MD 20852, Phone: (301) 770-3333, FAX: (301) 770-7062.

**Editor's Office:** Bradley D. Kliever, Editor, 4604 Chicago Ave. So., Minneapolis, MN 55407, Phone: (612) 823-2657, FAX: (612) 823-0151, MCI Mail: 470-2447.

**Advertising Sales:** Richard B. Dubin, Advertising Director, Frank J. Salamone III, Advertising Representative, John Muller, Advertising Assistant, Pinnacle Place, Suite 205, Albany, NY 12203-3409, Phone: (518) 489-4034, FAX: (518) 489-4045.



### Publisher and Editor-in-Chief

#### Editor

#### Executive Editor

#### Consulting Editor

#### Senior Contributing Editor

#### Contributing Editor

#### Assistant Editor

#### Copy Editor

#### Art Director

#### Associate Art Director

#### Assistant Publisher

#### Controller

#### Promotion Support

#### Administrative Assistants

#### Advertising Director

#### Advertising Representative

#### Advertising Assistant

#### Correspondents and Contributing Writers

#### Contributing Artists and Photographers

#### Production Manager

#### Production

#### Director of MIS

#### Manager of Circulation and Subscription

#### Circulation Assistant

#### Data Management

#### Legal Counsel

Edwin Black

Bradley D. Kliever

Alan S. Kay

Wayne Rash Jr.

William F. Zachmann

Michael Kogan

Claude d'Hermillon, Jr.

Susan Cooke Anastasi

Elizabeth Black

Susan V. Levine

Margaret M. Dutcher

Catherine Honigsberg

Steve Miller

Alexandra T. McDonald

Jodi Henning, Jodi Schultz

Richard B. Dubin

Frank J. Salamone III

John Muller

Carey Gregory, Todd Crowe,  
Barbara Opall, Jerry Pournelle,  
Gordon Scott, Marlene Semple,  
Herb Tyson

Leonard J. Eisenberg, Vickie Lewis,  
Kevin Pedicord, Tom Reed,  
Rick Stewart, Joanna Wiebe,  
Arlene Williams

Brendan Connors

Affiliated Graphics, Hart Press

Christopher J. Wees

Christine Garwick-Foley

Jose Luis Guzman

DK Micro, MediaAutomation

Thomas Crooks, Esq., Chicago  
Arnold Kalman, Esq., Philadelphia  
Dan Willard, Esq., Washington, D.C.  
Richard Milian, Esq., Orlando

### BPA International Membership Applied For August, 1993

*OS/2 Professional* is published monthly and mailed to qualified OS/2 users by I.F. Computer Media, Inc. Send correspondence, and all requests for qualified subscription forms to *OS/2 Professional*, 4604 Chicago Ave. South, Minneapolis, MN 55407, (612) 823-2657, FAX: (612) 823-0151.

*OS/2 Professional* is an independent publication not affiliated in any way with IBM. OS/2 is a registered trademark of IBM. All other trademarks belong to their respective companies.

*OS/2 Professional* accepts no responsibility for and will not return unsolicited manuscripts, photographs, artwork, software, data files, evaluation equipment, or computer diskettes.

© Copyright 1994, I.F. Computer Media, Inc.

Printed in the U.S.A.



Now that you are running a 32-bit,  
protected mode, preemptive multi-tasking,  
segmented virtual memory operating system...



## Don't You Want To See What's Under The Hood?

### Introducing **Pegasus** Resource Monitor™

for OS/2 version 2.x. The first affordable, **professional**  
performance monitor for OS/2 desktops and servers.

Confused about how to reap the full benefits from the powerful performance features of OS/2? Are you tired of tinkering with options without being able to measure what they do? Have you tried other performance monitor products and been less than satisfied with the results?

Pegasus unlocks the secrets of OS/2 so that you can drive your system harder and faster. Pegasus reaches into the OS/2 kernel to grab accurate statistics on CPU, memory and disk performance. Other OS/2 monitors saturate system resources. Pegasus keeps track of all OS/2 foreground and background activity, including DOS

and Windows apps, and does it with low overhead.

Pegasus lets you see inside OS/2 in real time or access comprehensive performance statistics using the Pegasus REXX extensions for analysis after the fact. Exceptions also pop up to alert you automatically when problems are occurring. Or Pegasus can display a concise graphical view of system performance on your desktop at all times.

For a limited time only, Pegasus Resource Monitor for OS/2 is just \$99. Competitive upgrade only \$69.

**Introductory price \$99**

**Competitive upgrade \$69**

Pegasus Resource Monitor is a trademark of C.O.L. Systems, Inc. All other company, product and brand names are trademarks or registered trademarks of their respective holders.

TOLL FREE 1-800-OS2-OS2-9 (672-6729)

FAX 813-261-6549

**ONDEMAND** Software & Services, Inc.



# So Where are the Apps?

**T**wo months ago in Chicago, Microsoft Chairman Bill Gates told me that the leading OS/2 applications were dependent upon substantial IBM subsidies for their survival. Earlier this year, Borland Chairman Philippe Kahn admitted in an interview that an independent software vendor couldn't make money in the OS/2 field without financial assistance from IBM. In this issue, PSP President Lee Reiswig confirms, "We did do some of that in the past, and it was very unsuccessful."

Athena will be rolling out a powerful new spreadsheet in August and Lotus keeps talking about adding Approach and Organizer to its OS/2 lineup next year. But other than those, there appear to be precious few major new applications looming from any developer of the stature of a WordPerfect, Borland, or Oracle. Indeed, it appears that the bulk of OS/2's new applications will continue to be developed by small ISVs, struggling to deliver powerful high quality native apps in a marketplace that has proven consistently unkind.

Yet developers large and small continue to commit major resources for Chicago—a product that by all accounts will be version 1.0 when it goes GA.

The core of the problem is that no matter how much OS/2 grows, it will always have dramatically less of an installed base than Windows. The more the desktop market grows, the more preloaded Windows systems are out there, the more OS/2 will be overshadowed. Even when IBM sells its 10 millionth copy, Windows will still be 40 or 50 million users ahead.

And that's only part of the problem. Existing applications continue to sell at a rate far below OS/2 itself. So the benefits of native 32-bit computing do not proliferate within the user community. Why? I suggest three reasons.

1. IBM. Big Blue continually misleads ISVs about the logistical and economic support it provides. For example, in the spring of 1993, IBM helped virtually bankrupt a number of vendors when it reneged on a promised coop advertising program. Today IBM, under dollar constraints, is doing less than ever before—and promising less than ever before. But the road

of broken promises is a debilitating one and many ISVs simply can't recover.

2. Many of the crucial ISVs are talented developers, but lousy businessmen. They haven't a clue about marketing. One of the best communication program developers was known for not sending eval copies to reviewers. Another developer refused to work with a catalog house because "that would cut into my direct sales." An exhibitor at the successful PSP Interchange in San Francisco reportedly complained to an IBM exec that sales were too brisk and he preferred a calmer pace.

It took one intelligent ISV, Tony Pereira of Clear & Simple, to grab the community by the horns and lead it into the OS/2

Vendor Council and OS/2 apps into the retail market. You have to admire the Council's gumption and its track record with such retailers as CompUSA. Indeed, *OS/2 Express* has just joined the Council and will now carry those apps.

3. Look at the horrendous experiences of others. Symantec, Borland, WordPerfect, DeScribe—they and many others offer ominous stories of monies wasted and profits not earned. Perhaps the most horrific of these stories is that of Lotus. It was a black day for OS/2 when IBM took over the marketing of SmartSuite, a solid package. IBM has murdered it in the retail

marketplace and is only now ramping up for corporate sales. But in that sense, there is some hope.

If IBM can make SmartSuite the success it is entitled to be, then it can convince hundreds of thousands of Windows users who are now using OS/2 that they can indeed operate at a higher level. We know IBM marketing is brain dead, but some of us believe in being born again. That is why we evangelize for OS/2. And that is why IBM should pull out all the stops and prove that native OS/2 apps are more than just a footnote to the system.

Otherwise, IBM should just come out and admit that its new mission is to simply be a better Windows than Windows. And that the "higher level" once envisioned for OS/2 applications now refers only to IBM's earnings. ♦

*Edwin Black*





# A CALL FOR NOMINATIONS FOR THE 1994 OS/2 PROFESSIONAL AWARDS

**Recognizing companies, products, and individuals for  
excellence and commitment in the OS/2 realm.**

The winners of the Second Annual OS/2 Professional Awards will be announced at the opening night reception of the OS/2 Technical Update attached to Network+ Interop, September 11 in Atlanta, GA. Our judges will evaluate products, individuals, and companies in eight categories nominated by our contributors and readers. So we're asking you, our readers, to offer nominations in any category you wish, and to cast your vote for the Reader's Choice Award.

## **OS/2 Pro of the Year Award**

To an individual dedicated to the advancement of OS/2.

## **Best Hardware Award**

For excellence in OS/2 compatibility.

## **Outstanding IBM Executive Achievement Award**

To the IBM Executive who has shown exemplary initiative, independence, and achievement in the field of OS/2.

## **Corporate Commitment Award**

To the company that distinguishes itself by a broad, sustained multi-product or multi-service commitment to OS/2.

## **Team OS/2 Award**

To the individual who demonstrates energy, devotion,

and idealism to the advancement of OS/2.

## **Marketing Award**

To the company that launches an innovative and effective marketing campaign involving OS/2.

## **Media Award**

To a member of either the computer media or general press, for an article, series, or broadcast, that displays significant insight into the benefits of OS/2.

## **Best New OS/2 Application Award**

For the best new native 32-bit OS/2 application.

## **Best New OS/2 Development Tool**

For the best new native 32-bit OS/2 development tool.

## **Reader's Choice—Best New OS/2 Application**

For the best new native 32-bit OS/2 application, as voted by our readers.

*One per person only*

Nominated Software \_\_\_\_\_ Version \_\_\_\_\_

Company \_\_\_\_\_

Your name, title, address, and phone number:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Judges: Edwin Black, Alan S. Kay, Bradley D. Kliwer, Michael S. Kogan, Wayne Rash Jr., and William F. Zachmann.

**Photocopy this page and fax to 301-770-7062 or mail to OS/2 Professional, 172 Rollins Ave., Rockville, MD 20852**





*Comments, criticisms, and observations*

### **There's still Ollie**

I completely agree with your editorial [Publisher's Memo, April]. However, your statement that since Spiro T. is now gone we have a chance to control the government is false. Remember, we still have Ollie North and his supporters to contend with.

**Lawrence A. Kaplan**  
*via the Internet*

*I stand corrected!—Edwin Black*

### **Consider the KGB**

I could not agree more with your Publisher's Memo [April]. I came to that same position months ago, as should any sensible person who isn't just interested in regurgitating the liberal/academic line.

I am a private investigator. Three months ago I went to a refresher seminar by an information vendor. I was shaken by the experience of sitting next to two men who spoke Russian to each other throughout most of the presentation except for when they were directing questions at the speaker about where they could get access to medical and insurance information. These two men conceivably could have been recent emigres; even so, something told me their best market for sale was the East bloc.

The vendor conducting the seminar provides access to personal and public information on-line that allows anyone with access to develop a complete profile on any individual, all for between \$50 and \$100. This is nationwide. Equal, if not greater, amounts of information are provided on businesses.

If you headed the KGB, could you find a cheaper entry into the life of every law-abiding citizen in the U.S.? Is it farfetched for me to assume that many foreign intelligence services already have "Internet analysts" on the job? And what do we have? We have people who go spastic with the thought that the FBI or NSA may check on their mail!

Let's monitor and control these agencies and let them do their jobs, and worry about our potential adversaries and enemies within and abroad. If anything, we should insist on greater capability and resources to meet the digital challenge. No right is above the security of the nation.

**Tony Fiorentino**  
*via the Internet*

### **A better key**

All a good cheat has to do is develop a layered encryption approach and just use the government's chip for data transport. There are mathematically proven keys far superior to the one proposed for use on this chip—variations the government does not want us to use because it would be "practically impossible" to decrypt if really necessary. Just use your own encryption technique, then send. If ever questioned (decrypted), it's just digital noise captured in a file.

So why even let the government waste our tax dollars on this? Undoubtedly, DoD, DOE, and the intelligence community will settle for different encryption systems, just in case. Why shouldn't we do the same? Democracy has its problems, i.e. crime, unemployment, drugs, etc., so let's just add secret messages to the list. If the government figures out the encryption, let's just make that legal. Then we can all wonder if the government knows or not. That's the extra surprise in our form of democracy.

**Steven G. LeMay**  
*via MCI Mail*

### **Back of the hand for Hands On**

I was disappointed to read what amounted to an unabashed advertisement thinly disguised as an "In My Experience..." story in your April issue. "The Backup Dilemma" [Hands On] was shameless in its extolling of the virtues of the commercial software package BackMaster. As is common

with dissertations of this nature, the article was decidedly one-sided.

In fairness, I hope you afford authors of fine shareware products the same free advertising you've provided MSR Development. Or, preferably, restrict comments to editorial reviews and require vendors pay for their ads.

**Dempsey N. Darrow**  
*Garland, Texas*

*For the record, Hands On is an editorial feature that reports on products as they performed in real-life enterprise situations.—Alan Kay*

### **Speaking of chips**

Your article on the Speech Recognition Revolution [Special Report, March] was interesting. However, I disagree with the processor recommendation for the IBM Personal Dictation System (IPDS). Neither IPDS nor OS/2 2.1 uses the math co-processor found in an Intel DX processor. It is true that a processor faster than a 25mhz SX is desirable. This can be accomplished with a 33mhz SX or SX2 processor when systems start shipping with this processor. The money saved on a DX processor could be better spent on a fast access hardfile or tape backup unit.

**Kenneth Head**  
*Boca Raton, Florida*

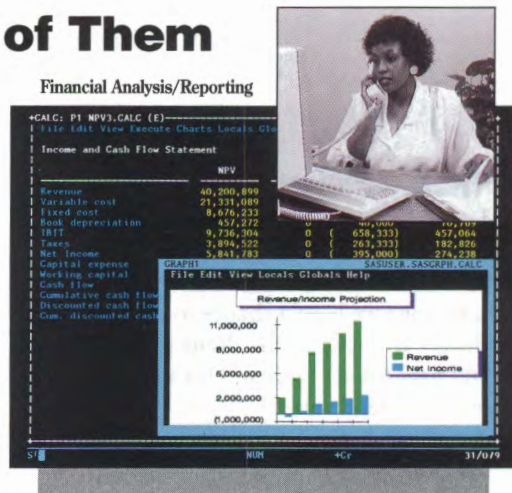
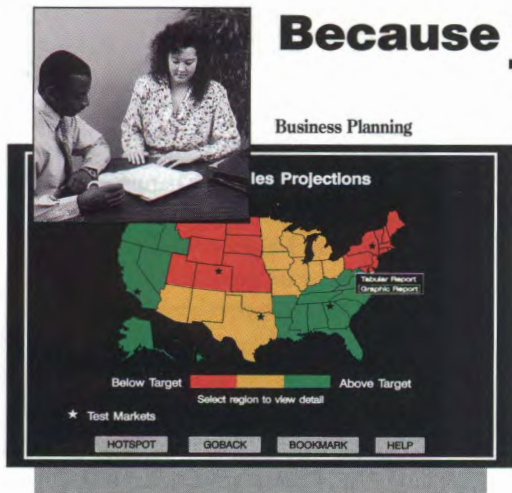
### **Speech, speech**

Is the abbreviation IPDS you refer to in your March issue [Special Report: The Speech Recognition Revolution] an acronym you created for the article or is it a new one from IBM? As a user of OS/2 and the AS/400, this gave me some pause; I thought IPDS stood for "Intelligent Printer Data Stream" on the 400. The proliferation of acronyms has caused some confusion not only when reading articles or talking to people, but also when calling IBM. For example, in the past I've had to explain to the IBM Support Center that I needed help with Programming

*continued on page 62*



**Because There Are More of Them  
Than There Are  
of You...**



# The SAS<sup>®</sup> System for Information Delivery



The CEO needs visual checks on all the factors critical to the success of the business. The CFO wants a "small" change in the financial reports. The marketing VP is anxiously awaiting pricing models. And they're *still* waiting for inventory and quality monitoring systems out on the factory floor. How can one IS manager—with so little time, so few resources, and so many budget constraints—meet the diverse needs of so many clients? The answer is the SAS System for Information Delivery.

## Integrated Applications for Enterprise-Wide Productivity

Unlike stand-alone solutions—which drain your software budget and drive up training and support costs—the SAS System gives you a cohesive, enterprise-wide application strategy. One that fits the needs of the executive suite, the manufacturing floor, and everywhere in between. One that supports cooperative processing across hardware platforms. And one that responds immediately to new or shifting applications demands. Virtually any application that involves accessing, managing, analyzing, and presenting data is available within the SAS System's information delivery environment.

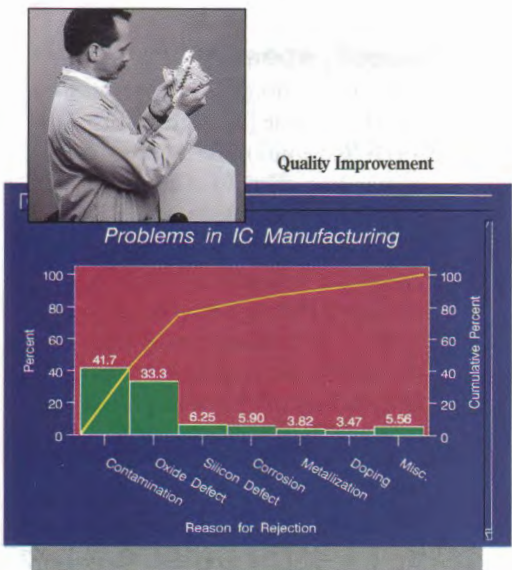
## Call Today for a Free Video Preview of the World's Leading Information Delivery System.

See for yourself why the SAS System is the only software you'll ever need. Give us a call at 919-677-8200 for your free video preview. Also ask for details about the free SAS System Executive Briefing...coming soon in your area.



SAS Institute Inc.  
Software Sales Division  
SAS Campus Drive □ Cary, NC 27513  
Phone 919-677-8200 □ Fax 919-677-8123

SAS is a registered trademark of SAS Institute Inc. Copyright © 1992 by SAS Institute Inc. Printed in the USA.







# BYTES & PIECES

*News and trivialities, important and obscure*



## Gee, Bill, how big?

The battle between the boys over the size of the OS/2 installed base simply will not go away.

The latest to stir up that particular tiff is Microsoft Chairman Bill Gates. During an impromptu interview with *OS/2 Professional* Editor-in-Chief Edwin Black at the annual meeting of the Corporate Association of Microprocessor Professionals in Chicago in early April, Gates declared that "active OS/2 users amount to less than a million. I'd be surprised if it was more than that."

IBM has of late been saying that somewhere between four and five million copies of OS/2 are currently in use. Gates rejected that notion: "Whenever they sell an upgrade to 2.0 or 2.1, they count all those units as new base. In reality, Windows is number one, Mac is number two, and you'd be hard pressed to guess who is number three."

PSP Marketing Director Wally Casey scoffed at Gates' mathematics, saying, "Maybe he meant there are just a million users in Seattle." Several weeks later, during the PSP Technical Interchange in San Francisco, PSP President Lee Reiswig challenged Gates: IBM has in fact shipped some five million units of OS/2, Reiswig insists.

So who's closer to the truth? "It's hard to tell," says John Gantz, an analyst with International Data Corp. "The million figure is way low. The actual number is closer to Reiswig's figure of five million, yet I'm not sure anyone in IBM actually knows for sure."

Regardless of the actual number of copies of OS/2 sitting in PCs, no one disputes that it's far smaller than the number of copies of Windows. And while estimates vary dramatically, Gantz puts the ratio of Windows to OS/2 users at around 10 to one.

## The preload perplex

There is broad agreement that one of the keys to establishing an operating environment in the marketplace is to sell the OS preloaded on computers. That's certainly one of the keys to Windows' current dominance. So we raised an eyebrow or two when we found buried in a March IBM PC Company announcement about on-site service this news: buyers of every PS/1 model shipped since last October, which are supplied with DOS and Windows loaded, will also get free upgrades to DOS 6.2 and Microsoft Works for Windows through the end of this month.

The PS/1 line is made by IBM. IBM also makes a desktop operating system named OS/2. OS/2 is not available on the 30-model PS/1 line.

## Curious, no?

So we asked how come. Why isn't OS/2 being marketed as an upgrade choice? The answers, sad to report, were less than clarion-clear. One IBM spokeswoman said, "That's not really the audience we're after." Another added, "The PS/2 group would make an OS/2 line if the demand was there, but currently there is not enough demand to do so."

IBM spokesman Keith Lindenburg defended the marketing move by saying that the PS/1 line "has historically been a DOS machine."

But this is the era of Lou Gerstner. One of the latest indications of Gerstner's determination to reshape IBM into a fighting machine was the departure of PC Company President Robert Corrigan. Corrigan, a determined defender of the PC Company as an independent company within IBM, earned high marks for his efforts at reasserting Big Blue's presence in the PC marketplace.

But Corrigan's steadfast dedication to his vision of the PC Company—it should sell Intel-based PCs, and sell them into existing markets, which means Microsoft Windows users—ulti-

mately put him at odds with IBM strategists.

So Corrigan will step down at the end of this month, leaving a fairly healthy division to G. Richard Thoman, a man keenly in tune with both mass and corporate markets, not to mention with merchandising and with his good friend Lou. Will he affect the bottom line? Will OS/2 and its future incarnations figure in to Thoman's long-term plans?

The jury's still out. More to the point, though, the company is still IBM. "It's still too early to tell for sure," said one PC executive who asked to remain anonymous. "But I can tell you that it will have little to no bearing on the preloading issue. It's a DOS market. That's what the public is perceived to want, and that's what they'll get."



## The game game

OS/2 finally appears prepared to leap the gap separating it from the DOS-dominated games market.

Developers are prepared to ship a half-dozen games for OS/2 by summer's end, and one company says it plans to ship between 12 and 18 titles by early 1995.

Most of the games available to OS/2 users have been shareware versions of such distractions as black jack, mah-jongg, and solitaire. Later this quarter, however, the "blockbuster" games should start shipping. First up: *SimCity*, which Dux Software Corp. licensed from Maxis and is porting to OS/2's Presentation Manager. The single user version "ported extremely well and will be almost five times smaller," says Dux President Robert Adams. Advanced Idea Machines (AIMS) will market both *SimCity* and *Galactic Civilizations*, a new game developed specifically for OS/2's 32-bit environment. At press time, AIM President John Schaeffer said both games would ship sometime this month.



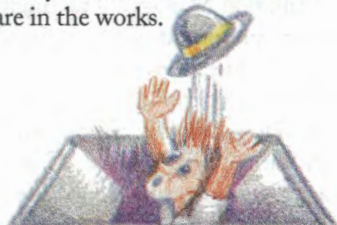
## BYTES & PIECES

Amazingly enough, IBM has picked up on the trend. Just last April, IBM's PSP division reorganized its Home and Games Consumer Marketing group because "it lacked a real consumer orientation," says Brand Manager Lloyd Webber. In fact, "lacked" may be an understatement. Prior to the reorganization, PSP did not have even one person directly responsible for that segment of the market. Now, Webber says, there will be several representatives responsible solely for the home and games market.

Webber himself has been working closely with several games developers seeking to port their products to OS/2. One is id Software, owner of the futuristic *Doom*. The two companies have been discussing a collaboration that would port the game to OS/2, although at press time a "roadblock" had arisen. Webber did say, however, that if the companies were able to sort things out, he would like to ship *Doom* in time for the August rollout of Personal OS/2.

The most surprising thing about the coming games breakout is that it has taken this long. Multithreaded operating systems such as OS/2 are ideal for games for the same reason that they support multimedia so well: the ability to maintain parallel threads makes for stronger graphics and a more immediate and responsive game environment.

One fact, however, is finally becoming clear to IBM—or at least as clear as anything does within the Blue-Headed Monster: there is a massive market of gamers out there that is begging for attention. Queries are starting to come in from developers following the Games Developers Conference in April, at which OS/2 was much in evidence, and Webber says that more "blockbuster" deals are in the works.



### Through the TRAP door

Although many *OS/2 Professional* staff members have used OS/2 2.x since its

earliest days, until recently we have seen relatively few TRAP errors. Yet some users complain of persistent and unsolvable TRAP error problems on their systems.

All TRAPs are not reported equally. Some, generated by software applications, simply terminate the current window session. Those are nearly always related to bugs in the application software. More serious are the TRAPs that halt the entire system. Recently, we have discovered several hardware-related issues on our systems that led to a dramatic increase in the number of these more serious system TRAPs.

**COM2 support.** We have seen several systems that periodically TRAP while COM2 is in use. COM2 is often used as a mouse port (where COM1 is reserved for the modem or fax).

**Overcommitted memory.** When the swap file gets extremely busy, the odds of a TRAP seem to increase significantly (version 2.1 has reduced this problem). If you are experiencing periodic TRAP errors on an 8mb system and cannot trace the problem to another device, try adding more memory. The increase from 8mb to 16mb loosens cramped memory quarters enough to significantly reduce swap file activity.

A note to the swap file paranoid: it is not the size of the swap file that matters so much as the activity. If you open many programs simultaneously, the swap file will grow dramatically. We routinely see 10-17mb swap files on our system. We could, of course, return to a minimal size by adding 16mb of memory. But unless most of the open programs are actively running (as opposed to idly awaiting user input), the data may not be transferring between memory and disk very rapidly. Listen to your drive. If your swap file grows above 6-8mb and the drive continually chatters while you work, it's time to add more memory.

**Failing Hard Disks.** This one had us stumped for a while. One of our systems, which had been running flawlessly for more than a year, gradually began reporting more frequent TRAPs. At

first, we believed the system, which was working under increasingly higher loads, simply needed more RAM. The situation continued to worsen (with no other symptoms) until finally the hard disk failed completely. We have seen FAT-partitioned hard disks (and floppies) report CRC errors or Sector Not Found errors when the drive was failing. But, hindsight shows that the only warning this HPFS-formatted drive gave were increasingly frequent TRAP errors.

**Malfunctioning memory or memory subsystems.** If the memory (or the support circuitry on the motherboard) is not quite up to par, a system may experience TRAPs. IBM recommends replacing your existing RAM with SIMMs from the same manufacturer, rated for the same speed (i.e. do not mix 60ns SIMMs with 70ns SIMMs). This is overly conservative advice (for all of the above listed problems, IBM Tech support suggested replacing the memory). The most likely problem is that the memory is not quite fast enough for the system. Many systems have wait states that are configurable through the system setup utilities (typically by hitting Del as the system boots) or jumpers on the motherboard (check your owner's manual for details). If possible, try increasing the wait states and see if the problem disappears. If it does, you can be sure your memory is marginal.

**Other malfunctioning hardware.** Devices that work under DOS, and even some diagnostics programs (such as the AMI Diagnostics or the IBM Reference/Setup diskettes), may fail when pushed to the limits by OS/2. If multiple device drivers (such as the IBMINT13.I13 disk drivers) are available, try an alternative. Try to note what devices are in use when a TRAP occurs (we've traced problems to network adapters and serial ports via this methodology). If possible, swap components between systems to see whether the problem migrates with the hardware (at corporate sites, this is strong justification for standardized hardware). ♦



# The Long and Winding Road

BY WILLIAM F. ZACHMANN

IBM's PowerPC horse has stumbled badly out of the gate, giving Apple's PowerMac systems a solid furlong lead before making it to the first turn.

PowerMacs running System 7 are already selling in the tens (perhaps by now hundreds) of thousands. They have a large and rapidly growing native software base and the ability to run not only most 68K Mac apps but most DOS and Windows apps as well. As a result, the Power PC Reference Platform (PReP) systems being marketed by IBM's Power Personal Systems division already look like distant also-rans.

This is a long-distance course, however. There are still ways for Big Blue's PReP products to end up in the winner's circle.

In the first place, despite the PowerMacs' jackrabbit start and their undeniable attractiveness, Apple's entries also have some shortcomings. At least some of the things that make System 7 on Apple PowerMacs attractive to users initially are also things that could limit System 7's ability to sustain the PowerMacs in the longer term.

The first version of System 7 for the PowerMacs is a very straight port of the Motorola 68K version of System 7.1. In fact, it has a number of components that are still implemented in 68K object code and run in emulation mode. It does not support multithreaded applications and does not provide a preemptive multitasking foundation. In fact, it has even fewer capabilities than does Microsoft Windows 3.x; it is little more than a task switcher.

That makes it a very efficient platform to run single applications or to load multiple applications and switch among them. Combined with support for a wide range of software and a user-friendly GUI, that's enough to make it an excellent single-user client system. Like Microsoft Windows 3.x, however, it lacks the robust foundation required to support "industrial strength" deployment in a heavy-duty networked environment.

To be sure, Apple has plans to upgrade System 7 and to add the required capabilities. A major upgrade to System 7.5 later this

year is scheduled to add support for multithreaded applications and a number of other enhancements. The next major revision, code-named "Copland," is scheduled for completion in 1995 and is to add multitasking support, memory protection, and a new, expanded I/O architecture. Another major version scheduled for 1996 and code-named "Gershwin" is to move System 7 to a micro-kernel architecture.

For the present, however, and at least until Copland is delivered, System 7, like Microsoft Windows 3.x, lacks the solid foundation of a truly preemptive, multithreaded, multitasking operating system. In short, it lacks what OS/2 2.1 already provides on

systems built on Intel and compatible chip architectures. The Mac system actually provides a bit less than Windows does in the way of heavy duty operating system capabilities, and it won't be up to speed until at least some time in 1995.

At the moment, IBM is no better off. AIX on PowerPC systems is just a vehicle to extend downward IBM's RS/6000 workstation market. NT on IBM PowerPC systems is little more than a bad joke and an indication that there are still some very foolish people at IBM. And Workplace OS/2 isn't done yet.

When it is, however, IBM will finally have a powerful operating system for IBM PReP systems. Once done, Workplace OS/2 will provide precisely the sort of robust foundation for serious application development that both Windows and current versions of Apple's System 7 fail to provide.

OS/2's growing momentum in real-world applications development by medium and large organizations on Intel platforms will thus gain a crucial set of new options and opportunities on IBM PowerPC systems once Workplace OS/2 is ready to ship. If IBM can get it done timely and well, then its PowerPC systems will prove to be an enormously attractive option for those concerned with the serious business of business.

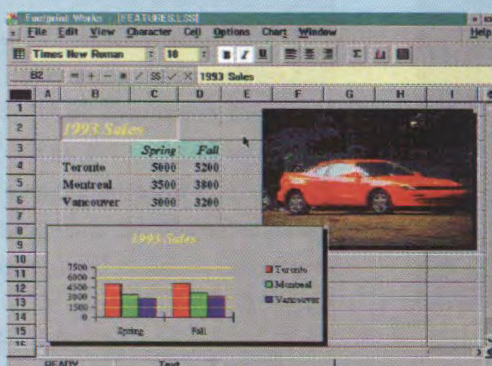
Obviously a great deal depends on who wins the race—who gets what software done when. If IBM cannot complete Workplace OS/2 soon, the odds favor Apple to retain and increase its





# At \$99 Footprint Works for OS/2 is sweeter than SUITE

- Word Processing
- Spreadsheet
- Charting
- Data Filer
- Report Writer



- Easy to learn and use
- Exchanges industry standard text/graphics/spread sheets
- Runs in only 8 MB of disk space

**Footprint**  
**WORKS** For OS/2  
**1-800-465-8470**

Available through OS/2 EXPRESS

Circle #62

## ZACHMANN'S VIEW

lead with PowerMacs. On the other hand, if Apple's schedules for System 7.5, Copland, and Gershwin slip while IBM delivers Workplace OS/2 soon, Apple's early lead with the PowerMacs could prove to be ephemeral and of no lasting consequence.

There is yet another factor that ought not to be overlooked. In many respects, Apple's and IBM's approaches to PowerPC systems are complementary. Apple has a high volume of sales to individuals in the short term, the advantages of a large initial selection of applications, and a superior platform for the low end. IBM, on the other hand, has the superior position in "industrial strength" applications, in the networked corporate environment, and with a shorter road to a robust operating system foundation to support all of that.

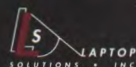
There are substantial benefits—and a major win/win opportunity—for both Apple and IBM to expand their already substantial collaboration on PowerPC systems. By doing so they can maximize the prospects for PowerPC systems generally and both can gain substantially at Microsoft's expense. Both Apple and IBM would be very, very foolish not to do so. ♦

## Crammed into your laptop?

Up to 4.2 GB  
for laptops —  
up to 520 MB  
for notebooks!

Are you outgrowing your laptop or notebook's capacity? Tired of software "quick fixes"? Now you can get the storage you need to effectively operate today's data-intensive applications and operating systems. **Up to 520 MB for notebooks** LSI specializes in internal upgrades. We can replace the factory-original hard drives in Toshiba, Compaq, and other major manufacturers' laptops and notebooks with higher-speed, higher-capacity drives without adding bulk or weight. If you're feeling the applications squeeze, call us. You'd be surprised how much room there is in your laptop...

Are you outgrowing your laptop or notebook's capacity? Tired of software "quick fixes"? Now you can get the storage you need to effectively operate today's data-intensive applications and operating systems. **Up to 520 MB for notebooks** LSI specializes in internal upgrades. We can replace the factory-original hard drives in Toshiba, Compaq, and other major manufacturers' laptops and notebooks with higher-speed, higher-capacity drives without adding bulk or weight. If you're feeling the applications squeeze, call us. You'd be surprised how much room there is in your laptop...



**(800) 683-6839**  
**Laptop Solutions, Inc.**

10700 Richmond Ave., # 114 • Houston, Texas 77042  
Local: (713) 789-0878 • FAX: (713) 789-8177

All product names are trademarks or registered trademarks of their respective owners.

Circle #193

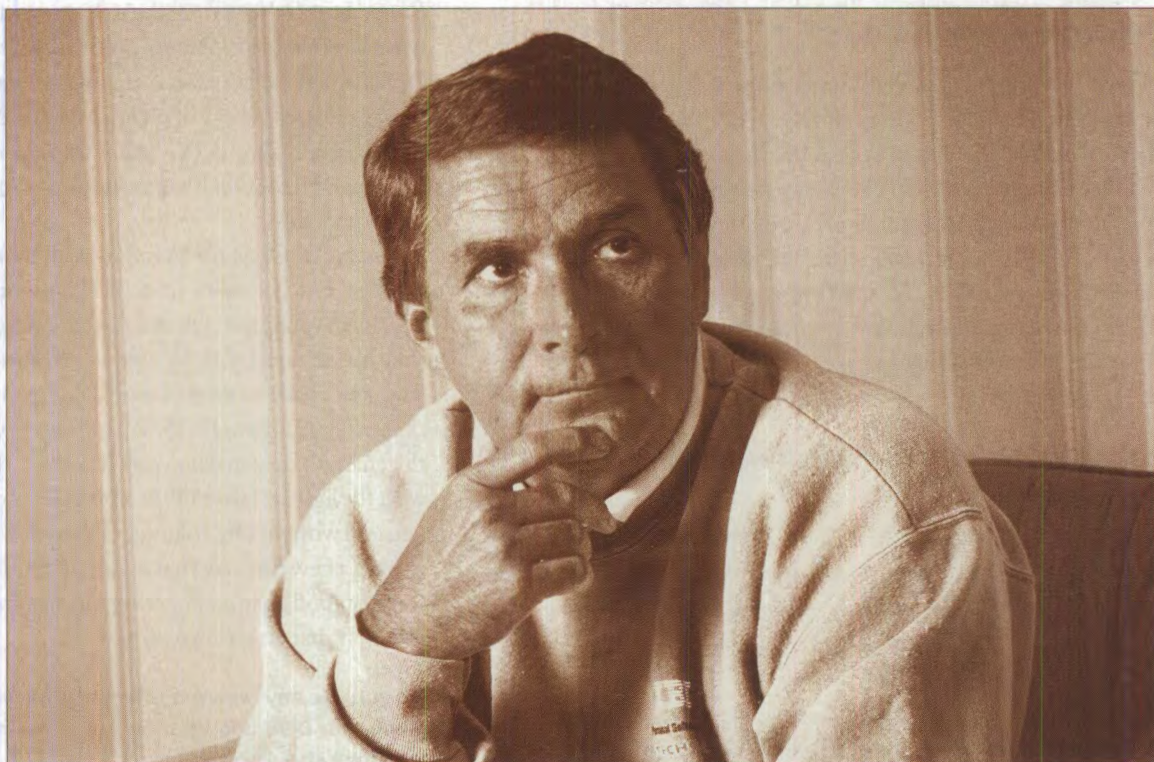


# Ask the Boss

## Q & A

*A straight-talk interview on topics of professional concern*

Lee Reiswig's job is to make IBM's Personal Software Products division successful and profitable. That means he must make OS/2 work, in the face of all IBM's mis-steps and the power of Microsoft's marketing. At the April 26 PSP Technical Interchange in San Francisco, Editors Edwin Black and Brad Klierer sat down with Reiswig, where he candidly answered some tough questions. An edited transcript follows.



**OS/2 Professional:** You've had a number of job descriptions over the past year. Now you are president of PSP. What do you think has been your toughest challenge in being part of the Gerstner effort to revitalize IBM and PSP?

**Lee Reiswig:** To a large degree for me, personally, it's finding enough time to actually run PSP and to do the things we need to do within PSP. It's also being able to take the time to share our experiences and strategies with the rest of IBM, so that we bring all of IBM together, as Lou wants to do, behind a consistent strategy and vision for the future. That takes a lot of energy in a \$60 billion company. So we're trying to manage both. Now we want to slow down PSP. We want to slow down the momentum we have in the marketplace, and we want to leverage the

enormous power IBM can bring when we all act in concert.

**Within the hierarchy of PSP who do you count on most for counsel and guidance?**

This may sound trite, but there really are four guys. Larry Loucks is my technical architecture system design guru. Dave Proctor is my development eyes and ears on what we can do and how we get it done. The third is a relatively new person in our organization, Dan Lautenbach. Last year, you did an interview with [general manager of worldwide sales and marketing] Bill Rich. Bill is now back to retirement. He was with us for a year—that's what we had in mind—and he really got a lot of important things started. Dan has now come in to pick up that responsibility. He knows how to



## Q & A

get the IBM sales force engaged and that's not a skill or experience I have. And then the fourth guy is the one who runs finance and alliances, negotiates with Lotus and so forth, and that's Mike Ray, my director of finance and planning.

**OS/2 is doing some extraordinary things in the latter half of 1994 and one of them is the new release of OS/2. Is that new release named 2.2 or 2.3?**

I don't know.

**You don't know or you can't say?**

I don't know. And it won't really be set until it's closer to shipping. I do have an opinion. I think it ought to be 2.2.

**What is the basis of the debate?**

These questions tend to be esoteric, internal debates as to whether something warrants a change of release number or version number—whether it's a 3.0, 2.2, or 2.1.1. It's a question of degree.

There are two sides to these arguments. One is, let's change the number and make everybody think this is a big deal. Two, if people think it's a big deal they're not going to quickly move to it in the large enterprises. In retail everybody wants the latest number, but in a large enterprise environment if they think there is a big change they're going to have to test it and go through a lot of work to evaluate it.

**So, going to a 3.0 number may slow acceptance whereas going to a 2.2...**

Would appear to be a minor change. Right. It's a question of balance here: does it warrant a significant change and what is the risk for customers? So 2.2—I think—is going to be late summer.

**Are we talking July or August?**

We're talking about finishing it in August, ramping up and building channels in September, and then blowing it out in the fourth quarter through the channels. I want it high volume in the fourth quarter. About the time there is a real beta on Chicago, I want to be shipping.

**What happens with OS/2 for Windows in this process?**

That's what it is—it's the next OS/2 for Windows.

**How does it relate to the forthcoming Chicago release?**

It's what Chicago hopes to be, quite simply.

**How long do you feel it will take Chicago to become a qualitative competitor and how will it affect your marketplace?**

Well, first question: My view of Chicago is that it is a release 1.0

operating system, not unlike NT, not unlike OS/2 2.0, and it takes years to get to the level we are at now. It has taken us years to get there and it's taking Microsoft that long to get there on NT. I think we're a ways from when a Chicago product can be of the qualitative capability that OS/2 will be at this year.

Your second question is what does Chicago mean to us? The best thing to happen to OS/2 was that NT shipped. I suspect the best thing that can happen to OS/2 right now is for Chicago to ship because then the reality will be there—we're not up against the paper tiger that can beat all comparisons.

**Microsoft still has a huge advantage when it comes to preloaded systems. Are you making progress in that area?**

Some, but we have to make the market first. Windows 3 didn't launch preloaded; Windows 3 launched as a retail product. Because of the retail success they were able to convince the OEMs that there was low risk in preloading. OEMs don't make the markets; basically they deliver what they think the market is buying. The demand for OS/2 has to continue to grow before OEMs ship OS/2 preloaded.

Secondly, OS/2 for Windows—Ferengi—is key to a preload strategy but it's more of a "make market" strategy because it doesn't have any risk, where our OS/2 fullpack did for an OEM—they had to take DOS/Windows off, basically, and put OS/2 on. You don't have to do that with Ferengi, right? You can put it on there, they can go to DOS/Windows, they can go back to OS/2—the changes they make in one reflect on the other; it's no risk. So with the lighter, faster OS/2 it is targeted more at the mobile market, and with mobile volumes taking off significantly, we're going to have a new thrust at that segment of OEM. So I think we stand a pretty good chance of getting a broad preload of OS/2 for Windows on that class of machines.

**Do you see any resistance from OEMs who say they're already paying for DOS and Windows on a per-machine basis and ask why they should pay another royalty to put on OS/2?**

A little bit, but not much—again, because they're not putting it on every machine because they don't yet see the demand at that level. But we're pretty flexible on terms and conditions and we can do lots of creative things with OEMs. I don't think price is the major issue for us.

**Is there going to be a major preloading—not on request, but a major from-the-factory preloading announcement in the next quarter?**

I'd say it's unlikely. I honestly don't believe there is any big deal like that where they would ship millions.

**Will we see a deal like that in 1995?**



## Q & A

Boy, I hope so. I'd like to set a goal for that.

### **When will you convince IBM to preload OS/2?**

That debate is over, I think. You'll see OS/2 available on all our systems. Now, that doesn't mean exclusively, but right now what we can't explain to customers is why they can get a machine with DOS and Windows but can't get a machine with OS/2. They should and will be able to get one with OS/2.

### **When will we see that?**

Tomorrow. I hope it will soon be available on all machines, the way customers want it.

### **That's on request.**

Yes.

**It comes with whatever the channel orders. So if a channel orders an OS/2 machine they get OS/2 machines. If they order DOS/Windows machines they get DOS/Windows machines. But I ask this: when I see an ad in the Washington Post for IBM PCs, is it going to say DOS, Windows, and OS/2?**

There will be some OS/2 in those ads but not the bulk because that isn't where the market is. Preloading is a fulfillment chain, it is not a market development chain.

**Does the preloading requirement require a 12 or 15 million installed base? Can you give me a number?**

That's a number I honestly don't know.

**You raised the issue of apps. At OS/2 Professional we know there are no new major software vendors looming out there in 1994.**

That is an oxymoron, "new major vendors." Who could it be?

**For the OS/2 marketplace, it could be Borland with Paradox. It could be Novell. WordPerfect could come back. It could be those kinds of vendors. Naturally, Microsoft would be the big one. And when I asked Bill Gates a few weeks ago in Chicago when he would start making apps for OS/2, he said there is no need to—you just use Windows because OS/2 runs it so well.**

He said that?

**Yes. But why aren't vendors rushing to develop for OS/2? Corel told us recently that 95 percent of their revenues come from Windows, with only five percent from Unix and OS/2. Philippe**

**Kahn says there is no way an independent developer can make money developing OS/2 unless IBM subsidizes them.**

Let's talk about that a little bit. We did try some of that in the past and in my view it was very unsuccessful. We got OS/2 apps but we didn't get *compelling* OS/2 apps. Basically what you find out is that the vendors have no stake in the product if you pay for the development. And if they don't make a market for it, they don't necessarily have to put the greatest functions in it—they're not committed to it.

The key is a relationship with vendors that generates a business return for them. When we restructured the arrangement between IBM and Lotus around Notes and applications we got a much more business-driven relationship as opposed to "We'll pay for your app—give us one." And when you can see sales results generate returns to ISVs, that's when they spend money.

The reason they don't invest is that they're worried they're not going to get their money back. They're not sure there is a market there, they're not sure the people are buying OS/2 even though we're selling millions of them.

Frankly, I think we are seeing apps come. New and different ones—not necessarily from the big guys. Frankly, these guys you

**I think the big problem we faced was that Ami Pro wasn't ready when we completed the deal.**

named are large single app vendors and that isn't what the market wants today. They must do something to coalesce or they're not going to exist.

### **Why did you restructure the Lotus relationship?**

To get it on a basis where it was synergistic to get applications funded by the business returns of us collaborating with Lotus—that's why we did it.

Speaking of Lotus, on the boards a major bone of contention is people saying it was a black day for the OS/2 community when so killer an app as the Lotus SmartSuite, which has now solved many of its performance problems, has had so deficient a marketing and promotion campaign. We see Lotus marketing its Windows products with great energy in the stores, in newspaper ads, and on the tours. But there is no mention of OS/2. Lotus people are not currently even making decisions on their OS/2 marketing, and we hear it's going to be dark for



## Q & A

**another three to six months on marketing and promoting Lotus SmartSuite.**

I think the big problem we faced was that Ami Pro wasn't ready when we completed the deal. They shipped it too early. So what the IBM marketing team saw was a product they didn't think they could sell, and as much as they wanted the suite, they didn't think they could go out with the original Ami Pro.

### **Because of the WordPerfect experience?**

No, not so much WordPerfect, but because of the quality of the Ami Pro product. It was purely this dog don't hunt, okay? So we went to work quickly with Lotus to get a revision that was much better. Now that we have something that we can put in the customer's environment and support—and we can claim it works—I think you'll see the energy go up on the SmartSuite.

### **What quarter?**

This quarter.

**I must ask you a question about Bill Gates. I stood inches away and looked into this man's eyes a couple of weeks ago. This**

**man hates IBM and OS/2. It's not just a business decision on his part. He has a lot of deep, personal animosity and I'd like to know why you think he harbors this intense ...**

He wouldn't tell you?

### **No he wouldn't.**

Well, I don't know. You know, Bill is a complex guy so he's going to have to tell you. But what I'd say is that OS/2 is a nightmare for him. He took an enormous risk in how we separated. He declared OS/2 dead before it was, he challenged IBM to be effective, and we're going to prove that he was wrong. And that's his biggest fear.

### **Why can't he get past that bitterness?**

Because he bet against us. He made a big deal of it. He told every consultant in the industry, announced to every developer in the world, that OS/2 was dead and nobody needed anything more than Windows. There was nothing that OS/2 was going to bring to the market. He's wrong—and Bill doesn't like being wrong.

Thank you, Mr. Reiswig. ♦

**USE IT or LOSE IT**

The GammaTech Utilities are designed to enhance and complement your OS/2 system. These utilities provide the ability to perform vital maintenance and recovery operations easily without extensive technical knowledge. Use GammaTech Utilities for your critical data or you might lose it.

## GammaTech Utilities for OS/2

• Undelete Erased Files	• Identify and Mark Bad Sectors	• Sort FAT Directories	• Add Comments to Files
• Optimize HPFS and FAT Volumes	• Reconstruct Boot Sectors	• View and Edit Selected Files	• Display File Fragmentation
• Backup INI and Desktop Files	• Protect/Lock Files	• Disk Sector Edit (ASCII or Hex)	• Display Directory Information
• Recover HPFS Volumes	• Permanently Erase Sensitive Data	• Display Volume Information	• SAA/CUA Compliant PM Interface
• Protect and Backup Boot Sectors	• Mass Delete Selected Files	• Alter File Attributes	

**For OS/2 Version 2**  
VISA, MasterCard, American Express, C.O.D. • Overnight Service Available

**(405) 947-8080 • Fax (405) 632-6537**  
**SoftTouch Systems, Inc., Workstation Division**  
1300 S Meridian, Suite 600, Oklahoma City, Oklahoma 73108



Circle #98



The key to  
making  
object-oriented  
technology  
work for your  
business  
is one simple  
equation.



**OOT = IBM**



---

**Object-oriented technology  
adds up for your business.**

---

Faster development. Increased programmer productivity. Higher-quality, lower-maintenance applications. Code reuse. The ability to respond quickly to changing business conditions.

Object-oriented technology is the answer you need to make your business more competitive. With 45 major-league development projects behind us, including OS/2® Presentation Manager® and COBOL/SF, IBM is the company that

for OS/2. With its exceptionally reliable 32-bit C/C++ compiler, its extensive C++ class libraries, and its full function browser, you have the language and the tools you need to produce serious OO applications today, with code that can easily be reused tomorrow.

---

**VisualAge™: A powerful  
new vision of programming™**

---

VisualAge is IBM's hot new visual programming tool that lets you produce scalable, object-oriented client/server applications with amazing speed. Using

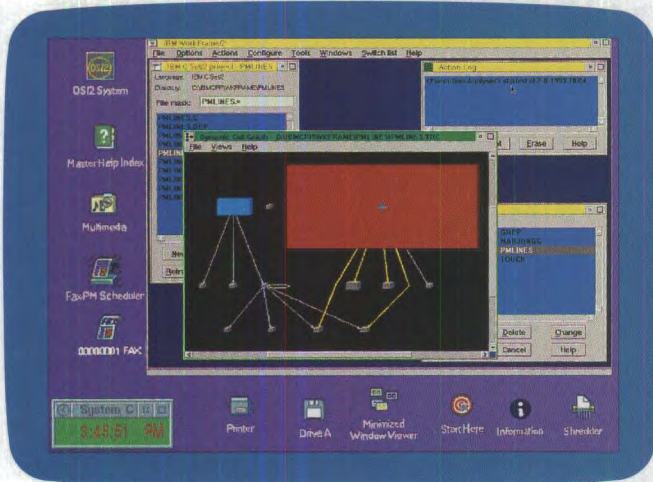


---

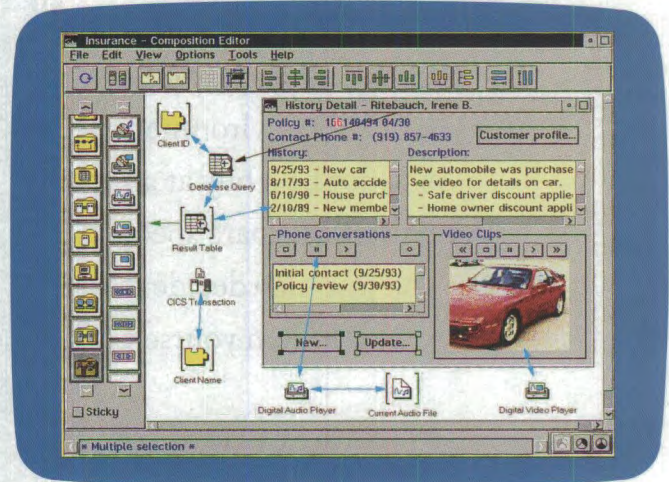
**SOM.  
The common thread for  
object environments.**

---

IBM's System Object Model (SOM) and Distributed System Object Model (DSOM) are language-neutral mechanisms for developing class libraries. With SOM, you can develop objects in one language and easily use them in another. And SOM supports CORBA, the Common Object Request Broker Architecture of the Object Management Group (OMG).



*C Set ++ is the most complete C++ object-oriented development tool you can buy for OS/2.*



*VisualAge combines the ease of visual programming with the power of object technology.*

delivers the object solution and the services you need to take full advantage of the new technology. From infrastructure to tools to development platforms for commercial and technical developers, nobody is doing more to balance the OOT equation than IBM.

---

**C Set ++™  
Mission-critical code starts here.**

---

IBM's C Set ++ is the development package behind many of today's popular software programs, like Lotus 1-2-3®

intuitive graphical interface tools and a completely integrated Smalltalk base, you and your team can link and share objects by connecting icons and build new industrial-strength applications out of code that has already been written.

VisualAge makes your programming faster and more responsive, because it lets you recycle your code instead of rewriting it. And it gives you easy access to the entire DB2® family of relational database management systems.

---

**Get started today.**

---

This is only the beginning. To receive our IBM white paper on new directions in object technology, or to order IBM OOT products and services, just call us at 1 800 IBM-3333, ext. STAR 700.

And we'll show you how easy it is to write yourself into the OOT equation.

SOFTWARE FOR OBJECT-ORIENTED TECHNOLOGY



IBM, OS/2, Presentation Manager and DB2 are registered trademarks and C Set ++, VisualAge and "A powerful new vision of programming" are trademarks of International Business Machines Corporation. Lotus 1-2-3 is a registered trademark of Lotus Development Corporation. ©1994 IBM Corp.



# Building YOUR OWN

The best buy in desktop PCs  
for your OS/2 environment  
may not be a buy at all.  
When you compare specs,  
you just may decide to  
build them yourself.

BY BRADLEY D. KLIEWER

## 1. BUILDING THE SPECS

Finding the perfect desktop computer is a pipe dream. The market is too volatile, the demands and expectations change too rapidly. But with a little planning and persistence, you can develop a set of corporate specifications for your standard OS/2 productivity machine.

Ironically, though, that's the easy part of adding desktops to an OS/2 enterprise environment. The *tough* question is one you may never have asked before: should you find a vendor who can meet your specifications, or should you consider—take a deep breath!—building them in-house?

There's no question it is easier to turn to a third-party vendor to supply equipment, for the same reason that outsourcing is mak-

ing a comeback today. The tradeoff is that, unless your order is large enough to generate a custom bid, you'll have to settle for what the vendor has to offer. And you'll have to pay that much more than the cost of materials and assembly labor.

But the best reason to produce your own PCs is that you can take control of your IT environment in a way that is rarely possible. And you can then be sure that *your* software environment can be loaded onto your desktops consistently and easily.

### One or Two Problems

There have been—dare we say it?—some problems installing OS/2 with certain hardware. These problems stem from a number of characteristics of today's hardware marketplace:

- Hardware typically is designed to conform to a series of easily listed performance or capacity specs, rather than optimized for a particular environment or use.
- As the pattern of preloads demonstrates, where systems are

*continued on page 28*







## 2. BUILDING THE SYSTEM

The day of the garage PC assembler is past—but that doesn't mean you should discard the possibility of producing your company's desktop computers in-house. Here's why—and how!

With general parameters in hand, *OS/2 Professional* designed a set of in-house specifications for our new systems. In the process we were reminded of two facts that are constants of complex, custom-designed machines. First, when you become selective with components, it's difficult to find a vendor who can supply a complete system. Second, even when you've found a suitable vendor, it's easy for similar-sounding components to slip by unnoticed.

In researching the subject, we both purchased a computer and built a computer—then decided which route to take for the remaining systems.

Photo: Vickie Lewis

### Quality Graphics

One of the first things you'll notice on an OS/2 system is the display resolution. VGA's 640x480 resolution is simply too cramped for general GUI use (or viewing multiple DOS sessions). But as you push to higher resolutions, such as the now-common 1024x768, display update times nosedive. With 256 colors, every pixel on the screen uses one byte of memory—thus, an increase from 640x480 to 1024x768 nearly triples memory usage. All things being equal, that would slow display updates by the same factor.

The goal, then, is to make things *unequal*. VESA local bus adapters move data into and out of memory at processor speeds rather than slower bus speeds. Further assistance comes from hardware that "draws" the display without processor assistance. When IBM introduced the Micro Channel architecture, it established a new standard, 8514/A, that draws lines, fills polygons,

*continued on page 32*



## 1. SPECS *continued from page 26*

designed for a model, that model is DOS/Windows.

- The history of the PC has resulted in a set of historical "standards" that have little to do with current utility or performance optimization.

None of these help the IS manager trying to buy PCs that will fit easily into the OS/2 environment. And all too often, the important architectural details of a given machine are hidden from view and much harder to determine than what CPU is installed and how much RAM has been provided.

For example, look at a magazine ad or catalogue or offering brochure. You know what clock speed the Pentium chip the PC contains is running at, don't you? But did the manufacturer undercut that by including disk controllers that must use the IBMINT13.I13 device driver (which maps disk access system calls through the slow, but more versatile, real-mode BIOS)? Or high resolution video adapters that are restricted to the old VGA 640x480 resolution (today's commonplace options are 800x600 and 1024x768)? In short, will the components hold up to the demands you are about to place on them?

I've often remarked that the best hardware diagnostic program you can buy for your computer is OS/2. Under a 32-bit, preemptive multitasking system that pushes every last piece of equipment in your system to its limits, the little things add up. If the hardware is ever-so-slightly out of spec, your techs will find that out all too soon.

The search for the right desktop tool is hardly an academic exercise for us. We are a company that publishes two OS/2 titles as well as other publications outside the computer field. We operate in three geographically dispersed offices, with a motley array of networked and standalone PCs. We need to standardize on a desktop platform that will run OS/2 well and maximize the productivity of our too few hard-working staffers.

### Conflicting Goals

As we sought to define a standard for purchasing new systems, we found ourselves trying to satisfy two sometimes conflicting goals: choosing hardware that will accommodate future developments and upgrades, and maintaining pristine compatibility with OS/2.

When looking at systems, it's tempting to rely on processor speed as an indicator of performance. But system components

tend to lag far behind the trails blazed by Intel's technology—often by orders of magnitude. You really must ask, "As 50-100mhz processors push clock cycles down to the sub-20ns range, how much extra performance can I squeeze out of the commonplace 10ms hard disk, 60ns memory, 14.4kbps modem, and 10-16mbps network adapter?"

System designers can bridge these timing gaps with features such as static RAM caches and disk controllers with built-in cache memory. Nevertheless, ever-higher clock speeds deliver diminishing returns as the subsystems play catch-up.

### Digging Up the Right Architecture

In the best of worlds, one need not make compromises or accept trade-offs. But we knew we could not cost-justify PCs with unit costs upwards of \$5,000 each. In all probability, neither can you. Given a choice between faster processor speeds and better overall system performance, we chose system-wide enhancement. And given a choice between processor speed and memory, the nod goes to memory—a fast processor is a poor investment if it's simply thrashing data that should be in memory to and from a swap file.

So, despite the fact that we publish a magazine that could be much fatter if it had dozens of ads for blazingly fast Pentium and clock-tripled 486 machines, we decided to do the responsible thing and set our "sweet-spot" at a cost-effective and productive 486-33 with 16mb of RAM.

That's not to say we decided to relegate ourselves to a spot forever behind the technology curve. We set out to spec systems that would serve our needs for at least a few years to come. One way to insure that is requiring that any system we bring in has a ZIF (Zero Insertion Force) processor socket that supports upgrades to higher speeds (50mhz and 66mhz) and next-generation chip technology. To upgrade such a system, simply pull a lever, remove the old chip, insert the chip, and change a few jumpers on the system board.

Many OS/2 performance obstacles have their roots not in CPU or RAM capacity but in an antiquated system architecture based on the original IBM PC and IBM PC AT. These systems were designed around the 8/16-bit 8088 and the 80286 (the "brain-dead" 16-bit successor to the 8088). Although PCs began to enter the era of modern performance with the 80386-based machines,





## SPECIAL REPORT

the optimization of architectural details lagged far behind.

For example, one of those 8088 holdovers is the communications circuit that runs the serial (or COM) ports. The original 8250 chip (and its successor the 16450) could process data only one character at a time. This method works fine when running at low communication speeds or when the system dedicates its resources to a single task such as transferring a file over modem.

But a multitasking system such as OS/2 may need to switch to another running program or deal with multiple communications sessions (such as LAN, minicomputer, or mainframe connections). As a result the single character buffer can quickly become overwhelmed, resulting in lost data. While most modern communication programs will detect and correct the lost data, the additional overhead can lead to greatly diminished communications performance.

As a minimum, today's systems need a 16550A (or equivalent) communications chip that can buffer up to 16 characters before the CPU intervenes. Lack of this chip can slow throughput dramatically under heavy load conditions—yet this information is often considered so trivial that it isn't listed by system vendors.

Then there's the rarely addressed issue of memory addressability. A modern OS/2 system should have full access to memory addresses above 16mb. While 16mb is sufficient for most of today's programs, you can bet that tomorrow's killer apps will quickly overwhelm such "meager" capacities.

You can protect your system investment by providing upgradeability to ever higher memory capacities. In most systems sold today, the CPU can access memory addresses that seemingly reach toward the stratosphere (typically between 128mb and 256mb). Yet subsystems within the computer may not have access to memory above 16mb.

For example, the DMA controllers, which can transfer data

directly between memory and a peripheral device such as a network adapter or disk controller, may address only the lower 16mb. This limitation stems from the 80286-based AT and its ISA (Industry Standard Architecture) bus, which addressed only 16mb.

DOS and Windows, which limit their core activities to the lower regions of memory, rarely run into problems with memory addressability. OS/2, on the other hand, can run into device conflicts (with bus-mastering ISA SCSI controllers, for example) that cripple its performance. In effect, OS/2 must also limit its core operations on these systems to the lower 16mb and use any additional memory as a large RAM disk for the SWAPPER.DAT file. While effective, this technique is not as efficient as full addressability.

You could, of course, set off on a major archaeological project digging out these little details from potential systems vendors. With that information in hand, you could order or build an ISA-based monster machine, one that would do battle for the top of the performance rankings. Or, you can simply recognize that the ISA bus has joined the ranks of the undead—technologies that should lie buried, but continue to rise again in your support nightmares.

Unfortunately, vendors keep turning to improved specifications such as VLB (VESA Local Bus) and PCI in efforts to resurrect the ancient ISA corpse. (Most PCs being advertised today are still ISA architecture machines.) VLB and PCI, two architectural standards that improve throughput on high speed devices such as video adapters, definitely have a place in the PC of tomorrow. But, it's time to leave ISA behind and put VLB and PCI in a better system.

Beyond ISA lie two major alternatives, Micro Channel and EISA. Of the two, we prefer Micro Channel: it's a system that, although dreamed up yesteryear, was designed from the ground up for the type of demands we place on systems today. Unfortu-

### OUR SPECS

#### The OS/2 Professional Standard PC

**Chip:** 80486 or equivalent, 33mhz

**RAM:** 16mb

**Architecture:** EISA/VESA Local Bus

**Processor Socket:** ZIF

**Serial Ports:** 16550A-based

**Graphics Card:** ATI Graphics Ultra (VRAM, 2mb)

**SCSI Controller:** Adaptec

**Hard Drives:** Quantum SCSI

**CD-ROM:** NEC MultiSpin 3X series (SCSI)

**Tape Drive:** Wangtek QIC

**Power Supply:** 250w

**Keyboard:** IBM Professional or Northgate Ultra

**Monitor:** NEC 4F- and 5F-series, Mag Innovision MXP





nately, Micro Channel suffers from three major problems: it was too far ahead of its time, the adapters were completely incompatible with previous systems, and IBM's early licensing strategies stunted its growth.

IBM is still the primary supplier of Micro Channel systems. Yet contrary to a common misconception, Micro Channel is widely supported by price-competitive third-party expansion boards. Micro Channel's primary advantages are standard use of 16550A serial ports, its bus-mastering capabilities (which let expansion boards talk to each other with little impact on CPU performance), and standard support for *level-triggered interrupts*.

Level-triggered interrupts are like students who raise their hands for attention until acknowledged by the teacher. They are persistent but non-intrusive. In a busy multitasking environment with several attached peripherals, level-triggered interrupts are easier to configure and less prone to problems than the older edge-triggered designs.

In the same classroom scenario, edge-triggered interrupts act like a teacher who asks students to shout "me" when they want attention. As long as only the students within the teacher's line of sight shout simultaneously, the teacher can keep track of multiple requests. But if simultaneous requests occur throughout a large classroom, the teacher may overlook some of the students. Similarly, if multiple adapters sharing a single interrupt level demand access, the computer may lose data.

Like Micro Channel, EISA (Extended Industry Standard Architecture) supports level-triggered interrupts and bus-mastering adapters. Unlike Micro Channel, EISA was designed to extend the ISA bus architecture and can use the older (and more common) ISA adapters. This can be an important factor if, like most corporations, you already have a large installed base of ISA machines and you plan to move peripherals between systems. It also gives you access to the broadest selection of peripheral devices at the most economical prices.

There's a problem with EISA, though: using an edge-triggered ISA adapter in an EISA system can restrict operations across the system. That's because once you allocate an edge-triggered interrupt within the EISA system, you cannot use both edge-triggered adapters and level-triggered adapters on the same interrupt level. Every time you add an interrupt-based ISA card to the system

you effectively reduce the addressable interrupt space.

Practically speaking, this is not a problem for one or two ISA-based peripherals. But EISA-based serial ports, parallel (printer) ports, and fax boards remain surprisingly hard to find, which means you may well be thrown back into ISA adapters. If you're not selective (or not willing to budget the extra money required for EISA adapters), you can quickly clutter the interrupt beachhead with edge-triggered flotsam.

Nonetheless, EISA is an architecture for the present and the near future; ISA, regardless of the clock speed of the chip it supports, is an architecture of the past. As a computer publishing company that must stay in touch with our readership, we concluded that the ISA heritage of EISA machines should be a major factor, despite our inclination toward Micro Channel. (An added factor that's probably of more concern to us than most PC purchasers is the fact that a relatively new configuration, the EISA/VLB platform, provides an ideal test bed for evaluating ISA, EISA, and VLB adapters in one machine.)

## Reaching Out to Peripherals

When setting corporate standards, you should plan not only which system architecture has the best fit, but which peripherals maximize your technology investment.

SCSI peripherals present one of the most effective expansion options on any bus architecture. SCSI-2's transfer rates can exceed the limits of an ISA system, thus making EISA/SCSI (or any other advanced bus with SCSI) an effective match. A single SCSI (pronounced *scuzzy*) adapter can simultaneously support numerous hard disks, optical disks, tape backup units, and scanners.

At one time SCSI devices were relatively expensive. But today, SCSI hard drive prices carry only a slight price premium (and in some cases none) over IDE devices. With a SCSI interface on the hard disk, you can add additional SCSI devices without buying additional controllers. (This is something to watch out for when ordering, since many SCSI peripheral packages include the adapter unless you specify otherwise.)

EISA, Micro Channel, and to a lesser extent ISA are well suited for peripherals in the moderate speed range—mass storage, printers, scanners, networks adapters, and the like. One device,



## SPECIAL REPORT

however, works at the speed of memory—the video adapter. While Micro Channel and EISA are fast, they are not fast enough to keep pace with memory cycle times. VLB (the older spec designed for 386/486 technology) and PCI (an Intel standard aimed primarily at Pentium technology) are—for now.

### The Final Call

Understanding what's behind the various specs is an important first step in specifying the machines you'll buy. You must also make a series of judgment calls, however, on how far you want to push the technology. (The accompanying story details the process we followed.)

In general, we (as do most corporations) prefer to stay clear of the "bleeding edge" of technology, and even not to push the leading edge very hard. Not only does buying slightly older technology (for example, 486 rather than Pentium, or VLB rather than

PCI) save the corporate budget, it can also save support headaches for software and peripherals that were not designed for or tested on the latest hardware.

By all means, push for the fastest when there is a need (such as mission-critical spreadsheets that take hours to recalculate), but try to match the accelerated hardware as closely as possible to the run-of-the-mill systems that form the backbone of your corporate operations (this is where ZIF sockets pay off).

Once you have the spec sheet in hand, you can then go shopping for the systems or components best tailored to your needs. It is at this point that you must decide whether to opt for a systems vendor or a do-it-yourself construction project. As you put your plan into action, remember to keep things balanced: too much attention to one factor, such as speed or price, can come back to haunt you in down-time or support costs. ♦

## BREAKING THE BOTTLENECK WITH PCI

**E**ISA offers one way to break through some critical limitations in the ISA motherboard design.

Another promising new option is PCI.

PCI is a promising newcomer, and most system vendors are now including PCI options in their lineups, with many more to come, including PCI for systems with non-Intel architectures (such as the PowerPC).

PCI provides a high bandwidth connection between I/O subsystems and the processor and main memory—ideal for devices such as graphics adapters that operate at memory cycle speeds. In addition to PCI video adapters, vendors are now supplying other high-data-volume adapters such as disk controllers and network adapters. Because PCI can handle several adapters (typical motherboards include three or four PCI slots), many are looking to PCI as a replacement for Micro Channel and EISA.

At first glance, a four-slot configuration seems sufficient for future expansion needs, even on an ISA bus. With one slot

each for graphics, disk, and network I/O, you may still have one slot free for expansion (and plenty of ISA access left over for all of those really slow devices such as serial ports, printer ports, floppy controllers, and so forth). Who needs more?

You very well may, for your client machines. Your network server most certainly will.

With the promise of voice processing and multimedia come high bandwidth requirements for audio and/or video capture cards and full motion video processors. Next-generation network controllers (such as 100mbps technology) will push network data rates an order of magnitude higher. You will be best prepared for these technologies if you leave at least one or two PCI slots free.

Current network and disk devices are well-served by EISA and Micro Channel transfer rates. Thus, your best option PCI-enhanced system would include standard bus peripherals for these medium speed components—particularly on a server where multiple network and communica-

tion adapters are important.

Similarly, as you move to RAID-enabled systems, multiple disk controllers working in parallel become an attractive performance option. (We've seen parallel transfers over an eight-drive Micropolis Raidion supported by four EISA SCSI controllers.)

PCI is a forward-looking specification. For example, maximum transfer rates are standardized at 33mhz on either a 32- or 64-bit bus (32-bit boards will work on 64-bit systems). Maximum data transfer rates thus peak at 132mb/sec (32 bit) or 264mb/sec (64 bit). PCI supports both low-power 3.3V as well as the (currently) more common 5V logic.

By the time you read this, PCI should be maturing nicely. By the end of 1994 we expect PCI to be well-entrenched and a worthy extension standard for EISA.

We opted, however, for a conservative approach in system design: let others work the kinks out before buying into the technology. ♦



## 2. THE SYSTEM

*continued from page 27*

and moves data from one area on the screen to another with little processor overhead. (In an older VGA system, the CPU must calculate and set every pixel for each such operation).

After performance and cost/benefit analyses of available video cards, we decided to use the VLB version of the ATI Graphics Ultra, a plug-in graphics card that offers hardware-level backward compatibility to the IBM 8514 standard (1024x768 with 256 colors). That provision ensures OS/2 compatibility, if not quite state-of-the-art performance. ATI enables further gains through the use of custom OS/2 drivers that use Graphics Ultra features to extend 8514/A operations.

### The Ins and Outs

As we've outlined, a SCSI subsystem for CD-ROM, tape backup, and hard disks takes advantage of the EISA architecture while leaving plenty of free expansion slots (and interrupts) for other uses. Here, we selected Adaptec products: its adapters were the earliest non-IBM SCSI controllers supported by OS/2 which, in theory, assures more mature device drivers.

After much fingering, keying, and punching in, we chose IBM and Northgate Omni Key keyboards as our preferences, based on their keyboard "feel"; we gave Northgate a slight edge for its support of duplicate function keys along both the left side and top of the keyboard. At the time we built our systems, Northgate keyboards were nearly unobtainable (a situation that has since been resolved), and our systems were split 50/50 between Northgate and IBM Professional keyboards.

Several peripherals, while important components, have less effect on the overall system performance or offer far fewer distinguishing features between brands. In some cases, backward compatibility may be more important than raw performance.

For example, most of our existing systems use Wangtek 5525 QIC tape drives. Overall, we prefer these larger data cartridges to the slower (and lower-capacity) QIC mini-cartridges. The 525mb (uncompressed) capacity matches the half-gig hard disks on the systems while maintaining tape exchangeability between the installed Wangtek drives and some of our older, lower-capacity Tecmar QIC drives.

For CD-ROMs the most important criterion is SCSI-2 compatibility. All SCSI-2 CD-ROMs use the same command set

(and thus the same drivers). Because these standards are more established than some, we were a bit more adventuresome and selected NEC's new triple speed CD-ROMs—NEC has long set the standard for both speed and widespread acceptance in the market. However, at the time we built our systems, limited availability led us to substitute Toshiba's double-speed drives. Thankfully, the SCSI-2 command set used by both NEC and Toshiba means driver setup is identical.

Finally, concluding our SCSI-bus journey, we selected Quantum hard drives as the price/capacity leader in the SCSI arena at the time we specced our systems. Fortunately, drive standards (both floppy and hard disk) are fairly well established, and we could have accepted substitutions without undue concern.

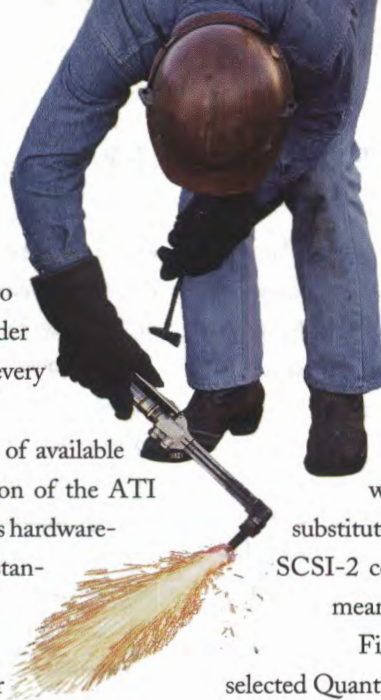
On a more subjective note, the NEC 4F and 5F series monitors headed our list for bright, sharp, and stable images. For editorial tasks we prefer the larger 5FGe, which gives us larger fonts and more working area for word processing. For more general office tasks (such as data management) the smaller 4FGe is more economical.

As we were going to press, however, Mag introduced the MXP17F, which presents a screen image the size of a 5FGe in the price range of a 4FGe. While the new Mag lacks the extreme brightness and contrast of the NEC, some users found the Mag's more subtle gradations of color less harsh during extended use. Furthermore, NEC has long been chastised for its monitors' high reflectivity—not a problem with the anti-reflective screen on the Mag. (NEC now manufactures a line of anti-reflective monitors, the 5FGP and 6FGP models, although they lack some of the brightness and contrast of the FGe monitors.)

### Choices, Choices

Our choice, then, for a standard desktop PC in an OS/2 environment—the one we decided to install in our company, and the one we'd recommend to you—is a 486-33mhz machine with the EISA/VLB architecture and 16mb of RAM, 16550A-based serial ports, an ATI Graphics Ultra card, an Adaptec SCSI controller, IBM or Northgate keyboards, a Wangtek QIC tape drive, NEC's MultiSpin 3X series of CD-ROMs, Quantum SCSI hard drives, and NEC 4F- and 5F-series or the new Mag monitors.

The more we looked for systems, the more we began to see advantages to building our own. We would get better control over





# ON THE BLEEDING EDGE

**O**f all the technologies built into our Cache-based systems, the SCSI controller/CD-ROM combo brought us closest to the "bleeding edge." The problems we experienced are bound to occur in many installations embracing new hardware technologies.

Left to its own devices (or at least its own device drivers), OS/2 will install itself on an Adaptec 2742T-based SCSI boot disk without too much trouble. Nevertheless, a successful installation is far from an optimal installation.

When OS/2 sees an unrecognized disk controller (such as the Adaptec 2742T), it by default loads the IBMINT13.I13 device driver to access the hard disk. This driver runs through the slow but versatile ROM BIOS routines designed for real mode, single-tasking operating systems such as DOS. Within OS/2, it is a kludge that (mostly) works. Once OS/2 has been installed, you can use the Device Driver Install program to load Adaptec's native OS/2 drivers.

But this approach left us out in the cold when we tried a CD-ROM install of OS/2. Since the CD-ROM is not bootable, the install starts with two boot diskettes. But those boot diskettes, using the IBMINT.I13 driver, would not recognize the Adaptec/NEC combination. Fortunately, IBM built a back-door into the install program. If you copy a

driver (AIC7770.ADD for the Adaptec 2742T) to CD-ROM Install Disk 1 and add to the CONFIG.SYS on that diskette the line BASEDEV=AIC7770.ADD (or whichever driver you're going to use), the install program will load the driver and even copy the necessary files and CONFIG.SYS additions to the final hard disk installation. (As always, don't try this on the original diskettes—use a backup copy.)

Unfortunately, the configuration program gets confused by the Adaptec 2742T/NEC CD-ROM combo. At the end of the first stage of installation (the character mode portion that ends with a reboot), the intermediate-stage CONFIG.SYS on the hard disk contained multiple BASEDEV=AIC-7770.ADD lines as well as a BASEDEV statement for every SCSI controller OS/2 supports (such as AHA\*.ADD and FD\*.ADD), and the entire spectrum of .FLT drivers for CD-ROMs (.FLT files are filters that convert SCSI-2 commands to SCSI-1 commands for older CD-ROM drives). The second part of the install process would not recognize the CD-ROM drive until we had removed all but one of the AIC7770.ADD statements and all of the extraneous disk controller statements.

Of course, that means that somehow you must edit the CONFIG.SYS file before the install program has completed. If you've

used FAT-formatted partitions, you can simply boot DOS and use EDIT or EDLIN. If you have HPFS-formatted drives (as we did), you must boot from the first two OS/2 Install Disks and hit Esc when OS/2 asks whether you want to continue with the install. At this point, you will be unceremoniously dumped at the [E:] prompt (or whichever drive your CD-ROM maps to), running OS/2 in character mode with full HPFS access to the hard disk.

That would be fine were it not for the fact that IBM has not yet had the foresight to include a character-mode OS/2 editor in OS/2. If you need to change an errant CONFIG.SYS on a non-booting system, you are left to your own devices. We used a shareware editor available on several bulletin boards called Technical Editor from On-Target Software.

Once the CONFIG.SYS was cleaned-up, we re-booted the system and the PM portion of the installation proceeded without problems. But at the end of the second stage we were once again forced to remove extraneous BASEDEV statements from CONFIG.SYS. ♦

## Technical Editor version 2.65

On-Target Software  
PO Box 17355  
Irvine, CA 92714  
415 474-9973

**LIST PRICE:**  
\$39.95



the components and could maintain better consistency down the road. After all, a system vendor may decide without warning or notice to switch key components to a different vendor for a better price or when supplies become limited.

In the ready-to-run arena, Gateway was the only major vendor that offered most of the components we specified. Queries by fax and phone confirmed that all of the basic elements we wanted were available in its model 4DX-66E (curiously, they lacked any SCSI CD-ROMs or tape backup units). In fact, it bettered our specs, since the standard configuration used a 66mhz processor instead of a 33mhz processor. (As we were going to press with this article, however, we were bitten by the component switch bug—Gateway no longer offers an EISA-based system.)

Realizing that a system on the bench was better than five on a spec sheet, we ordered a test system and immediately ran into our first roadblock: Gateway had EISA-based 72-pin SIMM (memory) modules on back order, and it would be at least a month until the system shipped. So while waiting for the Gateway, we embarked on a build-it-yourself project.

For our home-built models we selected Cache Systems' U.S.-made 358 series motherboards bearing an Intel 486 in a ZIF socket which would allow an upgrade to a 50- or 66mhz 486 or the forthcoming Pentium-based P24T Overdrive chip, which Intel plans to ship toward the end of 1994. (Since we ordered our systems, Cache has produced a slightly modified model with 3.3V logic that supports clock-tripled DX4 chips—75mhz and 100mhz 486s). We mounted the systems in a 250-watt Super-Power mid-tower case, selected for its sturdy metal frame and because its power switch does not sit next to the A: drive eject button.

We used a combination 3.5 inch/5.25 inch Teac floppy drive (both drives are in one housing, with the smaller drive above) that mounted in one of the wider 5.25 inch bays at the top of the case (the power button would have been poorly located had we used standard 3.5 inch mounted drives).

For I/O we selected the DFI MIO-550 card, which bears dual 16550A serial ports, a bidirectional parallel port, an IDE hard disk controller (which we disabled in favor of a SCSI controller) and floppy disk controller (also disabled and provided through the SCSI adapter). We installed the Microsoft bus mouse, leav-

ing both serial ports free (which, inadvertently, also prevented further problems later on—see the sidebar on serial mice, p. 37).

As noted, the VRAM-based ATI Graphics Ultra VLB adapter formed the foundation of our graphics subsystem, and the Adaptec 2742T Twin Channel EISA SCSI controller (which an Adaptec official had told us was compatible with the older 1740 series) attached to 512mb Quantum Pro drives rounded out the base system. The Adaptec 2742T nearly led to our mental unhinging—but first things first.

Gateway's limited SIMM availability was not the only delay we faced. The Northgate keyboards were on back order for months; fortunately, keyboards are one of the last items needed on a system. The NEC triple speed CD-ROMs were also in short supply and we turned to Toshiba double speed technology for a few systems.

### Built but Bootless

We built our systems—and they refused to boot. As it turned out, recent changes to the ATI chipsets were incompatible with the VLB on the Cache motherboards. Luckily, we weren't the only ones to find this out. Within 24 hours of installing the new ATI boards in its own test systems, Cache modified a PAL (Programmable Array Logic) chip on the motherboard to fix the problem. We popped the new chips into the motherboards and were up and running. Sort of.

We discovered problems with the Adaptec 2742T at just about the same time the Gateway arrived, sporting its Adaptec 2740—no T. It turns out we'd failed to notice that the Gateway's adapter lacked the twin channel suffix that designates support for 14 SCSI devices rather than the standard seven (another one of those little "gotchas" that are easy to overlook). What's the difference in cost for double the future expansion capacity?: \$20 to \$30.

In our initial tests, the Adaptec on the Cache worked flawlessly. But we soon discovered that certain installation methods were unreliable. For example, we ran into trouble installing from a CD-ROM. As with the ATI/Cache VLB incompatibilities, we eventually traced the problem to a chip on the motherboard (see the sidebar "Troubleshooting," p. 36). At this point, we had built systems that thus far worked reliably with OS/2.

While the Gateway ran OS/2 quite reliably, the machine was not without little problems of its own. IBM recommends





## SPECIAL REPORT

installing OS/2 with all caching turned off and the system in non-Turbo mode. Some systems (such as our home-built models) will install at full speed without any problems. However, the Gateway would crash when attempting a high speed install. Curiously, when we took the Gateway out of Turbo mode, the Turbo light stayed on. Despite the light, the system was running slower and OS/2 installed flawlessly.

We also noticed that the power supply, which we were told would be a 300 watt unit, was only 200 watts—on the low side for a server, but with today's lower power components it should not present a problem. The ATI Graphics Ultra was based on slower, less expensive DRAM rather than the VRAM on our

home-built models. And despite the SCSI-based hard disk, Gateway did not provide SCSI CD-ROM or tape drives among its standard options. This meant ordering a few peripherals through outside suppliers, diminishing the advantage of working through a single source.

To our hands, the Gateway's AnyKey keyboard does not feel as good as the Northgate Ultra or IBM Professional. It has a "marshmallow" feel, rather than a crisp "clicky" feel. Some people despise the clickiness of a tactile keyboard: if you fall into that camp, the Gateway rates the best of the soft-feel keyboards we've tried.

Tactile feedback aside, we're not fond of the AnyKey layout,

## OFF THE SHELF

In an attempt to give you some off-the-shelf options for desktop systems, we called the major PC vendors. Each was given a copy of our specs and asked to match it as closely as possible and to price out that system as a retail purchase. Since our time was short, we started with each company's press relations office; if we seemed not to be making progress, we called the direct sales number.

We can now report two things: PC vendors are surprisingly hard to get information from, and our machine is not readily available. With respect to availability, the issue, as we suspected, is the underlying architecture. Most of the vendors and manufacturers we called could not supply an EISA machine. A number of others did not provide OS/2-compatible SCSI support.

Four manufacturers responded with machines that more or less met our specs.

**ARIEL** (800-842-7435) told us

about a 486DX2-66 System it called the OS/2 Professional System. It had impressive specs, including a 1gb SCSI hard drive, an ATI graphics card with 2mb of VRAM, an Adaptec SCSI controller, a NEC triple-speed CD-ROM and a 15 inch Mag monitor. It would also be supplied with OS/2 preloaded. But the bottom line on the system was \$5,195.

**COMPAQ** (800-345-1518) offered its Deskpro XL 450 Model 270/CDS. The machine contains a 486DX2-50, 8mb of RAM (expandable), EISA architecture with PCI Local Bus, an integrated OS/2-compatible SCSI-2 controller, a 270mb hard disk, a SCSI-2 CD-ROM drive, and an OS/2-compatible QVision 1280P 1mb VRAM video card. This PC is supplied, without a monitor, at a company-estimated street price of \$2,799. According to the company, adding 8mb of RAM costs \$560.

**DELL's** (800-613-3355) Omniplex433 is also an EISA/PCI machine,

with the ATI video card, a 535mb SCSI hard drive and NEC triple-speed CD-ROM drive, and a 17 inch Dell Ultra-Scan monitor. This model has a NEC SCSI controller on the PCI bus, but it isn't OS/2-compatible, and would require the addition of an Adaptec controller. The Omniplex433 as shipped weighs in at \$5,779.

The **ZEOS** (800-423-5891) Pantera 486DX-33 is an EISA/-PCI local bus machine with 16mb of RAM, 16550A serial ports, on-board OS/2-compatible SCSI, a Diamond Stealth video card, an NEC triple-speed CD-ROM drive, a 528mb Seagate IDE hard disk, and the NEC 4FGe monitor, for \$3,597.

Unfortunately, our specifications don't describe a readily available off-the-shelf system. That's not a reason to compromise what we want in our machines or think you ought to have in yours; it's all the more reason to shop around, or to consider building your own. ♦



# TROUBLESHOOTING

If you plan to build your own systems, prepare yourself for some troubleshooting tasks. At times problems are obvious—if the system won't boot after you've installed a particular adapter, you can be sure the trouble lies in some way with the hardware. But symptoms can also mislead you in to believing the problem lies in software when it is really a hardware problem, or vice versa.

The Adaptec 2742T adapters we installed on our Cache motherboards are a case in point.

The errors first cropped up when loading OS/2 onto the systems via network (using IBM LAN Server's CID utility) or CD-ROM. The operating system would load, but then crash (with CONFIG.SYS-related errors) or TRAP upon booting. The systems would load and run DOS and pass AMI diagnostics without problems. But as soon as we tried to run OS/2, down they went.

Meanwhile, the Gateway 4DX-66E (which used an Adaptec 2740 SCSI controller) worked without a hitch. Of course, diskette-installed versions of OS/2 worked fine, and the Gateway had been installed from diskette.

Two principal clues helped us track the problem. First, we noticed that the diskette-based install used the IBMINT13.I13 disk driver instead of the AIC7770.ADD driver supplied by Adaptec. Any time you find IBMINT13.I13 in a newly installed CONFIG.SYS, you can be sure that OS/2 did not recognize the disk controller and fell back on the generic BIOS drivers.

Second, when we modified CONFIG.SYS to load the AIC7770.ADD, we discovered that some files copied

from CD-ROM to hard disk had a 0 value at every fourth byte. At first, we suspected a device driver problem. However, the Gateway appeared to work properly with the same driver. And even with newer versions of the OS/2 device driver, the problems persisted.

By this time, we were beginning to suspect a hardware rather than software problem. We tried replacing the Gateway's 2740 with a 2742T, and it continued to work, thus eliminating any minor adapter hardware differences as the source of the problem. The next obvious alternative was a timing problem with EISA bus-master transfers (the problem usually wouldn't appear until long files or multiple short files were copied). A call to Cache confirmed that its motherboard required a fix to work with the new Adaptec controllers, and the company sent a second PAL chip. (Our next step? We would have exchanged the adapters for the older 1740 series of EISA SCSI adapters.)

When you experience system problems, particularly in a corporate setting where many similar systems may be available, a few general steps will help you locate the source.

1. Call the vendor's BBS and download and install the latest device drivers or software upgrades.
2. Call the technical support department(s) and ask about known problems. If you're lucky, you will hit upon a known problem (and solution). Also post your questions on vendor BBS systems or information services such as BIX or CompuServe. While you're waiting for a reply, continue the troubleshooting process.
3. Try different configurations by

altering software parameters and hardware switch (or jumper) settings.

4. Try alternate software or drivers, if available (for example, most hard disk systems will work through the IBMINT13.I13 driver).

5. Move boards to different slots. Sometimes the electrical noise from one board will cause problems with another. We once saw a no-name IDE controller that interfered with a second parallel port adapter. Keeping the two adapters separated within the case resolved the problem.

6. Swap components (software and/or hardware) with other similar systems to see whether the problem is associated with a particular component or a particular configuration (such as swapping one SCSI-2 based CD-ROM for another vendor's SCSI-2 CD-ROM).

7. Swap components with drastically different configurations (such as motherboards from different manufacturers or processors with much slower speeds). Particularly as native processor speeds push into the 50mhz region and above (this does not include clock-doubled or -tripled processors, which typically run at 25mhz or 33mhz native speeds), the potential for timing problems or electrical noise interference increases. If you reach this point, it's time to consider switching adapters, motherboards, or dropping your speed requirements to a more conservative level.

8. Finally, report your findings to all manufacturers involved. They may be able to fix the problem (as in our ATI/Cache conflicts), or at least send the problem to the appropriate engineers (as happened with some network adapter problems we encountered—more about that next month). ♦



## SPECIAL REPORT

which does not place the cursor keys in the standard "T" layout. Rather, it resembles a second numeric pad with the corner keys programmed for diagonal moves (such as up one, left one) and the center key acting as an alternate spacebar. When editing, we would constantly lose our place (by hitting the wrong cursor key) and add spaces where none were intended. If every keyboard in the office had this layout, it would be usable and perhaps even preferable. But considering our installed base of T-cursor layouts, it is a hindrance.

### Build or Buy?

The overall comparisons yield a mixed bag. At \$3,900 (including shipping, but with discounts for volume purchases), the Cache systems base model cost slightly less than the Gateway (\$3,960) with its faster processor and bundled software. Building a system won't help your budget—especially if you include time spent assembling the computer.

Yet the finished Cache systems have a nicer feel and a few enhanced components: better monitors, better keyboards, slightly faster video, and higher-capacity power supplies. Certainly for computers that are in use for the better part of a workday, the keyboard and video subsystem affect comfort and productivity. Over the years, we've seen plenty of cheap keyboards start to lose keystrokes—sometimes within months and other times after a year or two of moderate use. Thus in addition to productivity gains, you may also recapture a slightly higher investment in terms of durability.

Ordering the Gateway was certainly simpler than dealing with multiple vendors for components, and little-assembly-required (not to mention no system board-level debugging) led to an easier installation. However, when you add in the costs of "improving" the Gateway to our standards—replacing the keyboard, upgrading the monitor, adding a bus mouse, and upgrading the

## SERIAL MICE

**M**ost users need, at most, one free serial port (for connection to an external modem). Since standard system configurations have two serial ports, most systems ship with a serial mouse that takes advantage of the unused port. When configuring new systems for *OS/2 Professional* we decided to buck the trend and use a bus mouse on a separate adapter.

Our decision was based on three factors. First, most of our external modems use COM1, so we prefer to configure serial mice on COM2. Second, several months ago we discovered that one of our Northgate systems had trouble running a serial mouse on COM2—it kept generating TRAP errors and crashing the system. A call to IBM's technical support line confirmed that some systems have problems running a mouse from COM2 when there is no device connected to COM1.

Third, since we use external

modems and would like to move toward peer services over our networks, we prefer to keep the second serial port free as a possible expansion channel for shared devices (such as serial printers).

In the course of configuring our Cache systems, we temporarily installed serial mice on a few of the systems. We soon discovered that any device connected to COM2 would eventually generate a TRAP while in use, whether or not another device was installed on COM1. On the first system, we suspected a faulty 16550A chip on COM2, but the problem persisted through several adapter swaps and across three of the systems. We tried replacement COM port drivers and mouse drivers to no avail.

Sometimes the TRAP occurs on the first access to the COM port, but more typically, it occurs only after prolonged activity (such as a long file transfer or extensive mouse move-

ment). The TRAP seems to be associated with IRQ3 (the standard interrupt level for COM2). We have worked around the problem by changing the serial board's jumper settings to map COM2 to IRQ2/9 (vendors will use either notation to specify the AT-style IRQ9, which has been cascaded onto the AT IRQ2) on systems that need access to the second port.

Fortunately, OS/2's device drivers allow alternate mappings, its device independence shields applications (such as terminal emulators) from these system details, and today's programs can take advantage of what once would have been unusable hardware.

The lesson? If you are experiencing intermittent TRAP errors on your system, check your system configuration. If any devices are connected to COM2 and COM1 is not in use, they may be the source of your problems. ♦



## SPECIAL REPORT

2Q'94

### Chip Prices

486DZ-33.....	\$260
486DX2-50.....	260
486DX2-66.....	360
486DX4-75.....	475
486DX4-100.....	580
Pentium-60.....	675
Pentium-66.....	750
Pentium-90.....	850

Price per chip in quantities of 1,000  
Source: Microprocessor Report

disk controller—it begins to lose the price/ease-of-installation edge. Furthermore, despite the high initial overhead of building our own systems, we can now assemble a system from components in about 30 minutes—it's really pretty simple once you get the technique down.

When supplies become a problem (as has already happened with the shortage of NEC triple speed CD-ROMs) substitutions are completely under our control. And as the systems age and components fail, we will have a better feel for our expansion/repair options.

All in all, building your system may be a more viable option than it might seem at first glance. We intend to continue building rather than buying. For us, the advantages of a maintainably

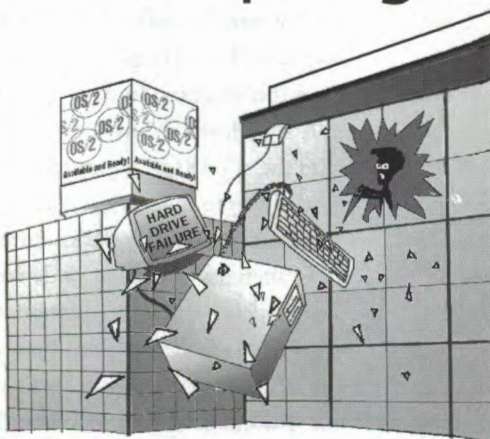
consistent hardware platform outweigh the disadvantages of a longer setup time. To make the effort worthwhile, however, you should consider the build-it-yourself option only if you plan to phase in several systems over a fairly short time period—we'd suggest five as a minimum starting point.

Of course, we have only begun to address the time required to build and install a complete OS/2 system. Because so few vendors currently preload OS/2 (and even fewer install a complete software configuration to your specification), you will find that software installation is far more time consuming than hardware installation, no matter which route you take. If you decide to build rather than buy, the best time to re-evaluate the build vs. buy decision may be when preloading becomes widespread.

In the meantime, there are techniques that can reduce installation hassles—a topic we'll address next month. Like system construction, CID software installation requires a rather heavy up-front investment of time and mental energy. ♦

Next Month: Part 2  
Tying It All Together

## Aren't you glad there's BackMaster?



### BackMaster is your OS/2 2.1 Backup Solution

Full, partial, incremental, and unattended backups  
Disaster recovery utilities included  
Supports FAT and HPFS file systems  
Backs up the desktop, long file names, EA's, INI files, and system files  
Reads existing DOS QIC 40/80 tapes  
Move DOS & Windows files to OS/2 using tapes  
Transparent background operation

**\$79.95**

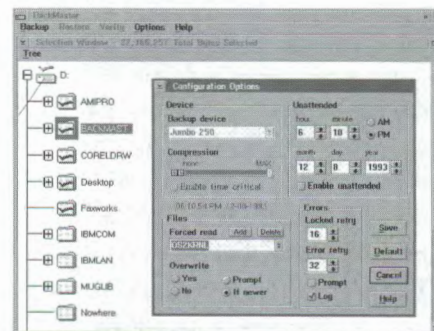
### BackMaster supports most QIC 40/80 drives:

- Archive XL series
- CMS Jumbo 120/250
- Conner 250
- Iomega TAPE250
- Mountain FileSafe 4000/8000
- Summit SE120/250
- Generic QIC 40/80 as a 2nd floppy

30 Day Money Back Guarantee!


**MSR Development**

P.O. Box 632070 Nacogdoches, TX 75963  
Voice: (409) 564-1862 FAX: (409) 560-5868  
BBS: (409) 560-5970 - Call our BBS for a Free Demo!



Requires OS/2 2.1 and 8MB of memory





**CALL about  
our NEW 32-bit  
PowerBoard™  
Upgrades**

**The only complete solution for Windows® and OS/2®**

**Toll-free technical support line**

PS/2 UPGRADES	
Model 25/30	\$ 495
Model 50/50Z	\$ 695
Model 55	\$ 695
Model 70	\$ 695
Model 60/65/80	\$1,295

Prices are for OMB memory, single unit pricing

Check/money order, purchase order,  
VISA, MasterCard, American Express



All registered trademarks are the property of their respective owners

Circle #208



BY POPULAR DEMAND, OS/2 Professional Interchange shirts are now available! They're 100% combed cotton, size XL in either aqua or coral. Also available: the OS/2 Professional baseball cap. Specify quantity, color, shipping address, and billing information below. Allow 3-4 weeks for delivery.

Please send me \_\_\_\_\_ golf shirts (\$25 each) \$ \_\_\_\_\_  
                   \_\_\_\_\_ Coral      \_\_\_\_\_ Aqua  
                   \_\_\_\_\_ baseball caps (\$7.95 each) \$ \_\_\_\_\_  
   add shipping \$ \_\_\_\_\_  
   TOTAL enclosed \$ \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Enclose check or money order or charge card authorization.

Please bill my ☐ Visa ☐ MasterCard

Card number \_\_\_\_\_ Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_

Send to: **OS/2 EXPRESS**

Send to: **OS/2 EXPRESS**  
172 Rollins Ave., Rockville, MD 20852  
Or fax order to: (301) 770-7062

# The spirit of Palm Springs





R.T.Savidge © 1994

# CHIP WARS REVISITED

REPORT • FROM • THE • BATTLEFIELD

BY MICHAEL S. KOGAN

While Intel's Pentium processor is still the odds-on favorite to capture the lion's share of the PC market, the two PowerPC platforms are rapidly emerging as strong competitors.

The Intel Pentium and the IBM/Motorola PowerPC processors are in the initial stages of what promises to be a bloody and fascinating competition for the desktops of corporations and consumers. You will be the ultimate beneficiaries—but that won't be for a while yet. For now, decision makers trying to establish their future directions and purchasing strategies are caught in the middle of a hardware tug-of-war.

The predictions we offered seven months ago in our report on the chip wars [Special Report, November] have largely been borne out. Intel's history and huge



## EYE ON THE MARKET

installed base have made the Pentium processor the odds-on favorite to capture the high end of the PC market and portions of the low-end and mid-range workstation market. However, the IBM/ Motorola PowerPC is rapidly emerging as the dominant RISC-based processor and the only potential competitor positioned to make a run at Intel's PC market share.

As we expected, though, the PowerPC is not yet making any inroads into that market because of immature operating systems and emulation technology, and because of the magnitude of Intel's dominance. Nonetheless, the Santa Clara chipmaker is facing increasing pressure on both the x86-clone and PowerPC fronts.

### Intel Competitors

Within the PC market, Intel's dominance is being threatened by x86 suppliers Cyrix, AMD, Texas Instruments, and NexGen. Of these four, the likely strongest competitor, at least initially, is Cyrix, which has now resolved most of its legal disputes with Intel, divorced its fabrication partner Texas Instruments, and signed a key deal with IBM. The pact gives Cyrix badly needed manufacturing capability for its 486 chips and its Pentium-class M1 processor (It's also, incidentally, a very good deal for IBM: it gives Big Blue the ability to create and resell Pentium-class chips without restrictions like those imposed on 486 chips in the current IBM-Intel agreement.)

AMD also has some things going for it. It currently is being used by Compaq as an alternative source of processors. And it is gearing up to compete at the high end with its K5 processor. Although AMD is still barely meeting demand for its current processors, it plans to open a new chip plant in 1995 and has also inked a deal to use DEC's excess manufacturing capability.

Texas Instruments, with its vast manufacturing resources, is also in the x86 race. But the most innovative x86-alike chip to appear is startup NexGen's Nx586 processor. The Nx586 is a superscalar RISC processor that translates x86 instructions into a proprietary internal instruction set called RISC86. It uses three advanced optimizations—speculative execution, out-of-order instruction processing, and register renaming—to maximize instruction throughput. Current samples of the Nx586 are being produced by IBM, but no agreement has yet been announced for volume production.

Unlike the Pentium, the Nx586 does not incorporate an on-chip floating point unit. Instead, NexGen opted for larger on-chip caches (16kb each for code and data)—a sort of "Pentium-SX." As was the case with early Intel processors, an Nx587

coprocessor provides the floating point support. Operating at 66mhz, the Nx586 delivers Pentium or better performance, primarily due to the larger caches.

These x86 competitors, primarily Cyrix and IBM, will make life difficult for Intel, but they're not likely to topple the Pentium from its position as the de facto standard. However, the competition they bring to the market will give consumers better price points and more options, while fueling further x86 market growth.

The PowerPC has emerged as the leading RISC architecture for two key reasons: the size of its producers' manufacturing and fabrication facilities, and the extent of their sales channels.

One measure of the success of a processor as a product is that it generates enough revenue to allow the vender to recoup fabrication costs and invest in fabrication facilities for the next generation of processors. In the past, RISC processor makers have depended on the workstation market's high per-unit margins to cover these expenditures. To compete in the lower-margin PC market, however, significantly higher volumes are required.

None of the other major RISC chip manufacturers (DEC, Sun, HP, and MIPS) has high enough market penetration potential to make this sort of competition substantially profitable. And the market isn't likely to stand still as they try to develop that potential; instead, their market standing will weaken further as the PowerPC advances into the x86-based PC market.

### The RISC Challenge

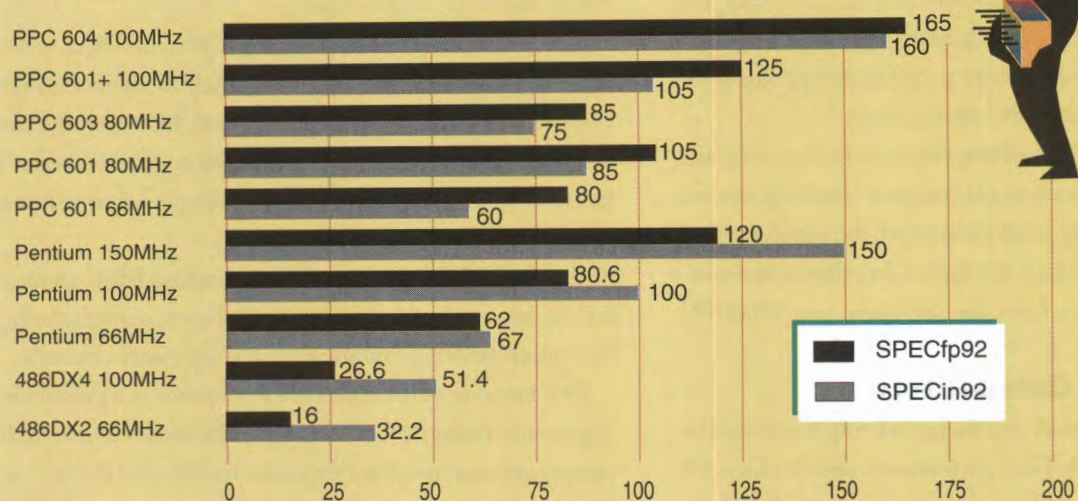
The two PowerPC platforms, Apple and the soon-to-be-released PowerPC-based PC, constitute the only real threats to the hegemony of the Intel architecture. Although there are x86 versions of some fine Unix platforms from the workstation market like SunSoft's Solaris and IBM's AIX, they are likely to continue as niche players in the PC market.

Apple has successfully shown how to introduce RISC technology into a proprietary architecture. It has done so by creating a system that runs existing 680x0-based Macintosh applications and also a new generation of higher performance PowerMac programs. More to the point, Apple has made the migration relatively painless for both its installed base and developers porting their applications.

In March, Apple began shipping in its Quadra line three PowerPC-based desktop machines, ranging from a low-end model with a PPC 601 running at 60mhz to a high-end model with an 80mhz version of the same chip. Like existing Macin-



## SPECmark92 Measurements



Source: Microprocessor Report

In performance terms, the PowerPC delivers better numbers than equivalent clock rate Intel chips. The two chip lines are more closely matched in the SPECint92 numbers, which measure integer performance and are more relevant for comparing how they do in running integer-specific native applications. In floating point performance, measured by SPECfp92, the PowerPCs are significantly faster.

**Note:**  
PPC 601+ and 604 estimates include 1mb external cache, and Pentium 150MHz is estimated.

toshes, the PowerMacs use NuBus for expansion, do not come with a parallel port (Apples use serial, SCSI, or AppleTalk for printers), and use a custom set of Apple ASICs to manage data flow in the system. A PPC 603-based PowerBook and PPC 601-based servers will arrive shortly, and more powerful systems will appear as the newer PowerPC chips become available.

Current PowerMacs run a hybrid PowerPC/Motorola version of System 7 that supports native 680x0-based applications. While much of the system is still Motorola code that runs using the system's 680x0 emulator, the most frequently used portions in the system toolbox have been ported to native code. When running native PowerMac applications the 80mhz PPC 601-based PowerMac is five times the speed of the fastest 68040. But it is 40 percent slower than that same 68040 when emulating 680x0-based Mac programs.

### Copland and Gershwin

Apple plans a two-year cycle of enhancements to the PowerMac operating system beginning in 1995 with the OS code-named Copland. Copland will be a native PowerPC implementation that finally adds preemptive multitasking and memory protection to the Mac OS; it will also be available for Motorola-based systems. Apple has also discussed Gershwin, a microkernel-based version of the Mac OS planned for 1996, but has not announced whether it will construct its own microkernel or perhaps license IBM's Workplace OS technology.

Apple's PowerMacs can also be configured with Insignia Solu-

tions' SoftWin to run DOS and Windows programs. On an 80mhz PowerMac with 16mb of RAM, SoftWin ran DOS and Windows programs comparably to a native 25mhz 486 system, but with only 286 compatibility and poor integration with the Macintosh environment. Insignia says it plans to update SoftWin later this year to provide true 486 emulation, and thus enhanced performance and compatibility.

As good as the PowerMac is, though, it is still not good enough to spark a migration of x86-based PC users to PowerMac. This is primarily because of Apple's proprietary architecture, SoftWin's 16mb RAM requirement, its less than optimal performance, compatibility, and integration, and price cutting in the Pentium marketplace.

### PRéP PC

The PowerPC Reference Platform (PRéP) is an open specification sponsored by IBM and Motorola that describes how to build a PowerPC-based PC that is compatible with those being developed by IBM's Power Personal Systems group. While PRéP has some confusing language about what is recommended rather than required, it does define a system architecture capable of running a multiplicity of operating systems and their applications. PRéP calls for a system based on the PCI bus and standard chip sets being made available by IBM, Motorola, and other vendors.

To date, RISC proponents have not had much success convincing the major PC OEMs to produce low-cost RISC-based

*continued on page 44*



# Where the Chips are

The most recent Pentium and PowerPC processors incorporate advances in fabrication technology, processor technology, and processor architecture. The chart below summarizes the attributes of the latest processors from Intel and IBM/Motorola. Intel has moved from a 0.8 micron process to a 0.6 micron process with the introduction of its 486DX4 and Pentium P54C chips. The new process results in smaller die sizes, larger wafers, better yields, and lower power consumption. The P54C also has an integrated advanced programmable interrupt controller (APIC), making it ideal for multiprocessor configurations.

On the IBM side of the ring, the company has increased the clock rate on its first-generation PPC 601 from 66mhz to 80mhz, and is now making the low-power PPC 603 using an improved 0.65 micron process. While the 80mhz PPC 601 is architecturally the same chip, the newer PPC 603 has several implementation improvements—an independent load/store unit, a split cache architecture, and register renaming—that contribute to improved performance.

IBM has also announced for 4Q94 the 100mhz PPC 601+, which is made using a 0.5 micron process to produce an even smaller, cheaper, and lower power chip. IBM will probably use the same process to further improve the PPC 603.

In performance terms, the PowerPC wins on points. At the

same clock rates, the PowerPC delivers a slight edge over Pentium in integer performance, and is significantly faster in floating point performance (see performance chart on p. 42). Because most applications are almost entirely integer-specific, the PowerPC and the Pentium processors should have competitive performance for most native applications, even as they continue to advance in performance.

In 1995, Intel will likely deliver a 150mhz version of the P54C, possibly using the new 0.4 micron process under construction for Intel's next-generation P6 processor. A P54C built at 0.4 micron could run at clock rates faster than 150mhz and have 16kb for each on-chip cache, significantly boosting performance.

The P6, expected in late 1995, will be developed on the current 0.6 micron process, then produced in volume using the newer 0.4 micron fabrication facilities. According to Intel, the P6 will integrate approximately six million transistors and deliver an iSpec92 rating around 200, making it twice as fast as today's fastest Pentium. Further details on architectural enhancements, such as whether the P6 will provide access to a native RISC instruction set as well as the x86, are not yet available. But it is likely the P6 will utilize speculative execution, out-of-order instruction processing, and register renaming to maximize parallelism and throughput.

IBM is expected to deliver a 100mhz PPC 603+ using the same

## The Latest Processors From Intel & IBM/Motorola

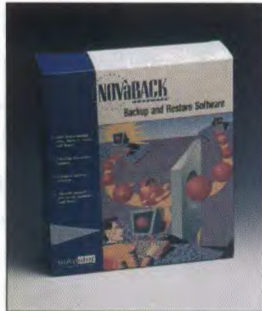


Processors	Pentium (P54C)	PowerPC 601	PowerPC 601+	PowerPC 603	PowerPC 604
<b>Clock Rate</b>	100mhz	80mhz	100mhz	80mhz	100mhz
<b>No. of Transistors</b>	3.3 million	2.8 million	2.8 million	1.6 million	3.3 million
<b>Fabrication Process</b>	4-layer BiCMOS	4-layer CMOS	5-layer CMOS	5-layer CMOS	5-layer CMOS
<b>Process Size</b>	0.6 micron	0.7 micron	0.5 micron	0.65 micron	0.65 micron
<b>Die Size</b>	163 mm <sup>2</sup>	121 mm <sup>2</sup>	74 mm <sup>2</sup>	85 mm <sup>2</sup>	196 mm <sup>2</sup>
<b>Cache</b>	8kb code/8kb data	32kb unified	32kb unified	8kb code/8kb data	16kb code/16kb data
<b>Est. Mfg. Cost</b>	\$150	\$100	\$75	\$55	\$180
<b>List Price (@ 1K Order)</b>	\$995	\$520	n/a	n/a	n/a
<b>Availability</b>	Now	Now	4Q94	3Q94	4Q94

Source: Microprocessor Report



# Back UP and running



NovaBack for OS/2 is a complete backup solution for all OS/2 workstations or networks. Support for OS/2 1.X and 2.X

is shipped together. NovaBack supports over 250 SCSI and QIC-80 tape drives. It is also compatible with LAN Server and LAN Manager networks.

NovaBack for OS/2 also comes with *NovaBoot-Disaster Recovery System*. NovaBoot allows you to prepare for your worst nightmare...a hard disk failure. No more having to Install the Operating System. That's right! Use NovaBoot and restore your entire OS/2 machine from tape.

With NovaBack you not only get backup, you get back up and running!

30961 Agoura Rd., Suite 109  
Westlake Village, CA 91361  
(818) 707-9900  
Fax (818) 707-9902  
Circle # 209

**novastor**  
CORPORATION

Available through OS/2 EXPRESS

Now available for immediate delivery

## DeScribe 4.1 BETA

The Leading Word Processor for OS/2

- BB Bargain Beta** includes: \$179.-  
 1) a Beta Copy of DeScribe 4.1, expires\* 12/31/94  
 2) a DeScribe Tutorial for DeScribe 4.0  
 3) a Complete Copy of DeScribe 4.1 when released, including full documentation.
- SE Subscription Edition** includes: \$299.-  
 1) a Complete Documentation set of Describe 4.0  
 2) a Beta Copy of DeScribe 4.1 expires\* 12/31/94  
 3) a Complete Copy of Describe 4.1, when released, including full 4.1 documentation  
 4) all Describe Updates through December 31, 1995.
- CU Competitive Upgrade** includes: \$159.-  
 1) a Complete Copy of DeScribe 4.0  
 2) a Complete Copy of Describe 4.1 when released, including full documentation.

\*Beta programs will not operate after 12/31/94.  
Guaranteed same day shipping.

All prices include UPS Ground shipping.  
Add \$7.- for Airborne 2 Day Service.

CREDIT CARDS ONLY

To order call: Bayshore 9 am-5 pm EST

**1-813-732-5500**

Circle #7

## EYE ON THE MARKET

0.5 micron process used in the PPC 601+, and possibly also clock-multiplied versions of the PPC 601+ and 603+ running at 135mhz or higher. However the real power on the horizon is the PPC 604.

The PPC 604 achieves its high performance using dynamic branch prediction, dual integer units, separate 16kb on-chip code and data caches, the aggressive use of speculative and out-of-order execution, and register renaming. Samples are expected to be available in 4Q94, with volume production by early 1995, several months before Intel's P6. It will initially be produced with the same 0.65 micron process used for today's PPC 603, but it is likely that during 1995 IBM will move it to the 0.5 micron process used for the PPC 601+, improving the PPC 604 yields, power consumption, and clock rate.

The PPC 604 will boost performance out of the 601, 603, and Pentium realms altogether. At 100mhz, the first generation PPC 604 is faster than a 150mhz Pentium, opening a performance gap that will be difficult for Intel to close. A 150mhz PPC 604+ in mid-1995 could further widen the performance gap.

Beyond the 604, IBM has announced the PPC 620, a 64-bit high-end chip that will replace the Power2 processor used in top-of-the-line IBM workstations. The PPC 620 is expected to have iSpec92 ratings above 200, with availability in late 1995—also before Intel's P6.

IBM is also developing the PPC 615, a PowerPC with an integrated 486 pipeline that would boost x86 emulation speeds to native x86 levels and beyond. In effect, this chip will eliminate any need for a user choice between architectures. ♦

*Chip Wars Revisited continued from page 42*

PCs. From a market perspective, that's hardly surprising: to maximize sales potential, OEMs want to build a universal system that can run any environment, Apple included. Today, System 7 can't run on PReP PCs, and Windows NT and Power OS/2, the two primary environments for PReP PCs, can't run on PowerMacs.

Although Apple is reportedly porting the PowerMac OS to the PReP architecture, it hasn't announced any licensing arrangements. The few OEMs that have announced plans for PReP support have indicated they will ship with Windows NT, which is currently in beta test. IBM's PReP PCs will initially be shipped with Personal AIX or Windows NT, and later with Power OS/2 when it is ready.

By the time PowerPC NT ships it will probably be at the Daytona release level; nonetheless, not until later in 1995 will it include the feature set slated for Chicago. As a result, NT on a



## EYE ON THE MARKET

PreP PC isn't likely to be any more attractive than NT already is today (which is to say, not very attractive) on x86, Alpha, and MIPS systems.

IBM's PowerPC implementation of OS/2, based on the Workplace OS technology, would be a very attractive alternative to Windows NT, because it already contains many of the same advanced elements planned for Chicago. Unfortunately, Power OS/2 is not even slated to enter beta test until this summer, making it highly unlikely that a full-featured PowerPC version of OS/2 will be available until sometime in 1995.

Since neither operating system is ready, PreP PCs are not yet ready for prime time. Furthermore, the Pentium P54C, OS/2 2.x, and OS/2 SMP for multiprocessor PCs (and perhaps Chicago when it is finally ready) give x86 users more features than RISC-based offerings and the ability to scale performance without compromising on price or paying for a migration to a new platform.

Fortunately, the future will be much simpler. Upcoming Apple PowerMacs will be offered with the PCI bus and discussions should lead to Apple and PreP PC convergence. At the same time, licenses for ports of System 7 to PreP PC and Windows NT and Power OS/2 to the PowerMac would create a similar degree of software interoperability.

### The Outlook

To even begin to look interesting, any RISC-based machine, be it PowerMac or PreP PC, must provide compatibility with x86, compatibility with the other RISC platform, *and* great price/performance. PowerMacs lack sufficient functionality within the mass enterprise environment, and need significantly improved x86 emulation technology. And given the state of today's PreP operating systems, we'll be waiting until well into 1995 for the PreP PC market to register at all on the utility and attractiveness scales.

For the moment, there is no reason to abandon x86-based systems for a PowerMac or a PreP PC when budgeting for next year. In fact, as the competition increases, Intel's price cutting will bring users more powerful x86-based systems than ever at very attractive prices.

If you're preparing your purchasing plans for 1995, 486DX4 and PCI-based Pentium systems are your best bets for new desktops, and multiprocessor configurations for new servers. However, keep a close eye on the resolution of the Apple and PreP PC incompatibilities, and by all means take a test drive of the PreP PCs when the real operating systems become available. ♦

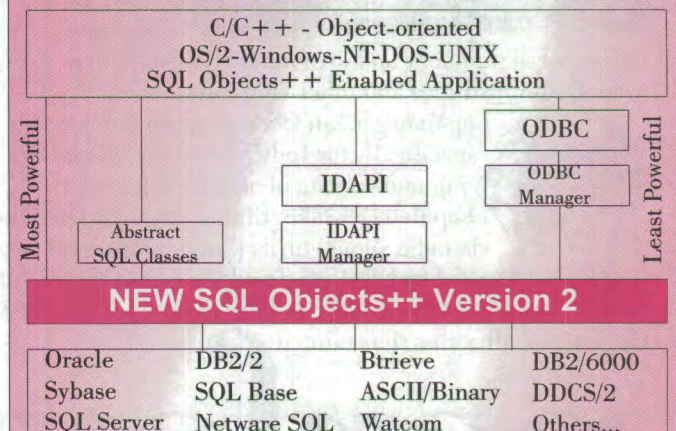
## ODBC or NOT? That's the question.

Ever wonder if ODBC really means "Only Does Basic Connectivity" or if Q+E stands for "Questionable + Expensive"? If so, join the crowd of programmers who have discovered the *true* meaning of Open DataBase Connectivity.

### SQL Objects++ is the answer.

The exploding Client/Server market has everyone searching for a database access method to hang their hat on. Unfortunately, all of these methods limit you to the lowest common denominator. With the release of version 2 of SQL Objects++ "you can have your cake and eat it too."

Don't base your application or future on a "one access" solution. Use a solution that allows you to access your database any way you like. Use a solution that is designed for performance. Use a solution that handles multiple operating systems with the same set of code. Use SQL Objects++.



We have a lot more to tell you but there's not enough room. So, pick up the phone right now and call **800-876-6585** for more information. Better yet, call and ask about our "No Risk (Really!) Guarantee" and our "\$99 Test Drive" option.

# Objects++<sup>TM</sup>

## SOFTWARE CORPORATION

47 Stonewall Street Cartersville, GA 30120

(404) 382-6585 - fax (404) 382-6374

Circle #112

SQL Objects++ and Inherit The Power are trademarks of Objects++ Software Corporation. All company and product names are trademarks or registered trademarks of their respected owners.

AVAILABLE THROUGH  
**EXPRESS**

June 1994 OS2 Professional 45



# Another

At the Indianapolis 500®, you only get one chance to get it right. No wonder lap after lap, the United States Auto Club (USAC®) depends on the mission-critical, pedal-to-the-metal performance of OS/2®



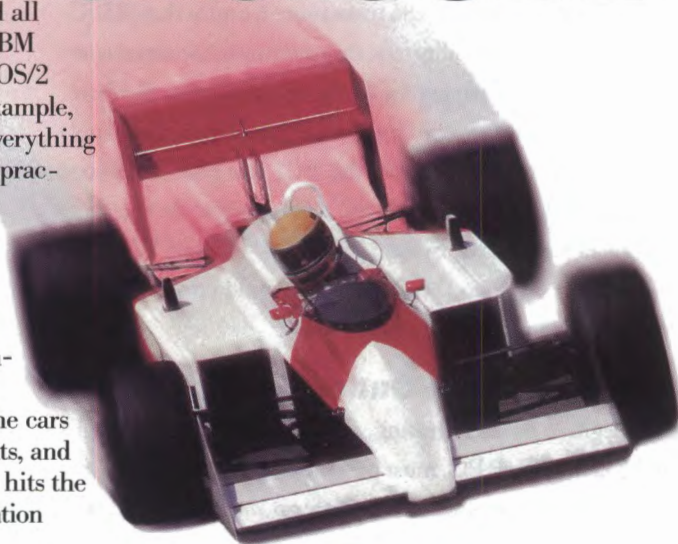
engine serial numbers, and driver and crew status to personnel, administrative and other vital information. USAC's



LapManager™, an OS/2 program developed specifically for Indy®, drives the official timing and scoring of all on-track activity. LapManager takes timing data sent from the cars via radio signal, turns it into meaningful stats, and sends it to PCs used by USAC staff and the press. OS/2 even hits the road in ThinkPad®s that collect and distribute race information from tracks all across the country.

From start to finish, OS/2 2.1 sets the pace for technology at the most famous motor speedway in the world. OS/2 programs run at full speed all over the place: IBM DATABASE 2™ OS/2 (DB2/2™), for example, keeps track of everything from entry fees, practice and qualifying times,

# clutch



# performance at Indy.

When you see how OS/2 can rev up *your* DOS, Windows™ and OS/2 programs, you'll know why they use OS/2 at Indy and over 100 other USAC races. You can't have a more impressive track record than that.

To order or to find out more about OS/2, call 1 800 3-IBM-OS2. In Canada, call 1 800 465-7999. OS/2 is also available at local software dealers.

## Operate at a higher level.™

This ad was created by LINTAS and got to this publication on time using DOS, Windows and OS/2 programs running on OS/2. IBM, OS/2 and ThinkPad are registered trademarks and IBM DATABASE 2, DB2/2 and "Operate at a higher level" are trademarks of International Business Machines Corporation. Windows is a trademark of Microsoft Corporation. Indianapolis 500 and Indy are registered trademarks of the IMS Corporation. All other products are trademarks or registered trademarks of their respective companies. © 1994 IBM Corp.





# The Basics of CA-Realizer

Despite some rough edges, CA-Realizer's advantages outweigh both its problems and BASIC's reputation.

BY BRADLEY D. KLIEWER

**C**A-Realizer is a product with an image problem. Here's a box with some funky graphics and a name that seemingly has no relation to its functionality. But behind that rather unassuming body lies a great mind.

CA-Realizer, for those who don't already know, is a programming environment built around the BASIC language—akin to Microsoft's Visual Basic. Unlike Visual Basic, though, Realizer runs in both native OS/2 and Windows environments. Likewise, the programs you write using Realizer can be compiled to both of those graphical environments.

Realizer works in three modes. The first, of course, is BASIC programming. The second is a graphics-based form designer called FormDev that builds GUI menus, forms, and objects. The third mode is a system called CA-RET that builds database queries and reports from dBASE or ASCII-delimited files.

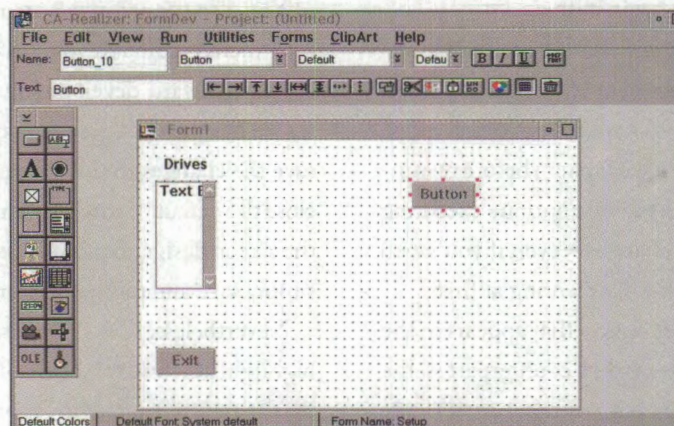
My long-term relationship with QuickBASIC meant I could be up and writing simple text-oriented Realizer programs without ever cracking a manual. But Realizer's basis in GUI programming made familiar teletype-style commands like PRINT ugly and cumbersome.

It wasn't until I started delving into the GUI-based aspects of Realizer that the manuals came in handy (and were at some points necessary). The on-line documentation provides as good a programming reference source as you'll find for Realizer (and

it could stand some improvement), but it does not help all that much when trying to learn the unique aspects of the Realizer environment. The manuals, on the other hand, contain some critical details that are either missing or difficult to locate in the on-line help.

My work schedule keeps me pretty busy these days—the last thing I want to do is learn yet another event-driven dialect for

managing I/O. The second Realizer mode, FormDev, handles the event-driven programming for you. Simply place elements (such as buttons, list boxes, and data entry fields) on a form and then link those elements to your program code. You can test the form directly within FormDev. Then, once you're satisfied with the results, tell FormDev to generate BASIC source code.



*In the FormDev mode, you can place an object, such as a button, on the form and CA-Realizer will give it a set of default attributes that appear at the top of the design screen.*

I've always approached generated code with skepticism. I like to tweak my programs, and I'd rather not get handcuffed into a development mode that limits my programming. Fortunately, Realizer's integration of a form-based development environment and the underlying BASIC language is first rate and doesn't impose undue constraints. Indeed, you can change the generated code and then re-import your changes into the FormDev environment.

The overall development environment seems a bit quirky in implementation, though. In fact, learning to work around some of those quirks could very well deter a number of programmers



from devoting the time it takes to become comfortable with the system.

For example, when designing a form through the form developer, Realizer presents a palette of tools and objects for quick access (many similar environments do the same). When you place an object, such as a button, on the form, Realizer gives the object a set of default attributes that appear at the top of the design screen (see screen shot). Thus, you may end up with a name like Button\_10 for your object. The resulting program will follow the same convention, peppering your code with references to Button\_10.

If you try to change the name by clicking the mouse into the Name field, typing a new name (such as OK), and then clicking back into the design screen, lo and behold, the button reverts to its former name (Button\_10). Of course, you *can* change the entry: you must hit Tab or Enter before moving the cursor with the mouse. It's not a difficult habit to master, but I wish it wasn't necessary to develop such a habit to begin with.

Another little pitfall awaits those who debug multiple module programs (which includes just about every program written in Realizer, owing to its design). If you change the code in a called module, you must reset the entire Realizer system before re-running the program. Otherwise, Realizer will continue executing the old code without noticing your changes—even if you saved them to disk. This process can be a bit disorienting at first.

To add to the confusion, the **Reset** option that appears in the

menu (and its counterpart in the debugging window) resets only the execution pointer. There is no menu item or icon to reset the system; instead you must hit Alt-Ctrl-F2 or execute a Reset command within your program.

Sometimes you'll run into limitations that are obviously related to the cross-platform environ-

ment. Yet these limitations are not consistently applied. For example, arrays cannot exceed 64kb of data (the maximum memory segment size for real mode and 16-bit protected mode operations, which should not affect OS/2). On the other hand, Realizer will accept long file names for both Realizer files and data files you create through your custom programs (an option which,

of course, is specific to the OS/2 environment). Should you need services not provided through Realizer, you can make calls directly to Windows or OS/2 APIs (thus restricting operation to the called environment).

I also discovered a problem with the form developer's code generator. I had named a form file Bench\_input, and as usual, Realizer prefixed all of the object names with bench\_input (e.g., *bench\_inputobjs.Iterations* for a data entry field). However, within the FormNew command (which creates a blank form sheet), Realizer kept dropping the underscore and used the name *form-benchinput*. To make the program run, I was forced to manually enter the underscore every time I regenerated the code from the design screen. It was a relatively minor annoyance (and one that did not affect any of the forms without underscores in the name), but was certainly puzzling the first time the debugger popped up—after all, I hadn't even written the code it was complaining about.

You also cannot save a source code file from the form developer menu, although you can edit and load files. This leads to a rather awkward development cycle: change the form with the screen design tools, generate source, edit source, leave FormDev, save the changes to the source file, reload FormDev (and wait), close the default Form1, and Import the modified code back into the screen design tool. It would be much more efficient if I could simply save and reimport after editing the generated source.

Nevertheless, CA deserves kudos for the two features that highlight the awkwardness of this cycle. First, it's noteworthy that it's even *possible* to import modified code back into the graphical design tool. And second, the underlying BASIC API extensions are intuitive enough to make manual modifications simpler than using the design tools. You could avoid the import problem altogether by simply adding the relevant BASIC statements to the objects' Action Code windows and never touch the generated code.

FormDev produced such clean, well formatted, and easy-to-understand code that I got a better feel for the program's activity by editing generated code directly. However, when changing visual attributes (such as color and object sizes) the development screens are much handier. Despite the awkwardness involved, I felt compelled to switch modes from direct coding to screen design based on my tasks (and methodology)—a compliment to the team that developed Realizer.

#### CA-Realizer 2.0

Computer Associates  
One Computer Associates  
Plaza  
Islandia, NY 11788-7000  
(516) 342-5224  
fax (516) 342-5734

**LIST PRICE:**  
\$247

ment. Yet these limitations are not consistently applied. For example, arrays cannot exceed 64kb of data (the maximum memory segment size for real mode and 16-bit protected mode operations, which should not affect OS/2). On the other hand, Realizer will accept long file names for both Realizer files and data files you create through your custom programs (an option which,





## **DX4-100 SCSI & Pentium Processor PCI/EISA Workstations**

### **DX4-100VLB/SCSI \$3995**

IntelDX4™ 33/100MHz MicronicsJXGc, 256k  
16 Meg 70ns RAM  
6-Bay 250 Watt PS  
1.44 Meg TEAC  
520 MB Fujitsu Fast SCSI II Hard Drive  
ATI Ultra Pro VLB Graphics 2 Meg VRAM  
BusLogic BK-445S VLB Controller  
Texel 3028 SCSI Double Speed CD ROM  
15" Mag LG1564 Monitor 1280  
MS WinWG 3.11; MS DOS 6.2  
Keytronics 101 Keyboard, MS Mouse-2B  
\*OS/2 2.1 CDR can be installed on any workstation in place of MS Windows.

### **DX4-100PCI/SCSI \$5395**

IntelDX4™ 33/100MHz American  
Megatrends Super Voyager II PCI, 256k  
16 Meg 70ns RAM; 6-Bay 250 Watt PS  
1.44 Meg TEAC  
1.6 Gig Digital Fast SCSI II Hard Drive 9ms  
Nexstor PCI SCSI Controller  
Matrox MGA PCI 2Meg VRAM  
Texel 3028 SCSI Double Speed CD ROM  
17" G Viewsonic .28 Monitor  
MS WinWG 3.11; MS DOS 6.2  
Keytronics 101 KeyBoard; MS Mouse-2B

### **66 Pentium Processor EISA/PCI \$6995**

Intel66MHz Pentium™, Micronics P66  
EISA/PCI Motherboard, 512k cache  
16 Meg 70ns RAM; 6-Bay 250 Watt PS  
1.2 & 1.44 Meg TEAC  
1.6 Gig Digital Fast SCSI II Hard Drive 9ms  
AMI EISA/SCSI Caching Controller 4 Meg  
Matrox MGApplus PCI 4 Meg VRAM  
17" NEC 5FGp Monitor  
NEC MultiSpin 3Xi CD ROM  
Boca 14.4 Fax Srf/Modem  
MS WinWG 3.11; MS DOS 6.2  
Keytronics 101 KeyBoard; MS Mouse-2B

# **Custom PC's for Power Users.**

## **Performance Workstations**

Ariel Design specializes in configuring high performance workstations and file servers for users who often have some very specific hardware requirements.

Our customers - from Fortune 1000 developers to individual traders in remote locations to government workers throughout the world - are driven by price and performance. They look to Ariel to provide the technical expertise and support for hardware configurations that meet specifications; that solve compatibility problems; or that just fill a list of choice components. These are often system configurations that support OS/2 2.1; MS Windows NT or NEXTStep.

It is this commitment to excellence, performance and value that has propelled Ariel Design to the forefront with award winning systems and outstanding reviews.



From high performance workstations to individual component and motherboard upgrades - American Megatrends and Micronics - Ariel delivers the value and the service that you've been looking for.



## **Ariel Design, Inc.** **COMPUTER SOLUTIONS**

9 West End Way, Norwell, MA 02061  
617/982-8800 FAX: 617/982-9095

**Mon-Fri 9-6 p.m. EST**  
**800-842-7435**

**Award Winning Systems.**  
**SCSI Specialists.**  
**30-Day Money Back Guarantee on Systems.**  
**One Year Warranty Parts and Labor.**  
**Expert Toll Free Technical Support.**  
**Systems Support MS Windows NT and OS/2 2.1.**



## **File Server and Business System**

### **DX2-66VLB \$2395**

Intel486™ DX2-66,  
Micronics JXG, 256k  
8 Meg 70ns RAM; 6-Bay 250 Watt PS  
1.44 Meg TEAC  
340 MB Seagate IDE Hard Drive  
ATI UltraPro VLB 2 Meg RAM  
15" Mag LG1564 NI 1280  
MS WinWG 3.11; MS DOS 6.2  
Keytronics 101 KeyBoard;  
MS Mouse 2-B  
EPA EnergyStar Compliant

### **FILE SERVER DX4-100EISA \$4995**

IntelDX4™ 33/100MHz,  
AMI Enterprise IV EISA/VLB,  
256k Cache  
8 Bay 300 Watt PS  
32 Meg 70ns RAM  
1.44 Meg TEAC  
1.6 Gig FAST SCSI II 9ms Hard Drive  
Adaptec 2742S EISA/SCSI Controller  
VGA 512K Graphics Card  
14" CTX NI Color Monitor 1024  
Keytronics 101 Keyboard,  
MS Mouse  
MS DOS 6.2



Prices and specifications are subject to change without notice. Prices do not include shipping. The Intel Inside Logo is a trademark of Intel Corporation. IBM and OS/2 are registered trademarks of the International Business Machine Corp. Other brands and product names are trademarks or registered trademarks of their respective companies. Call for details on guarantee and warranty.



# ASIAN OS/2 DEVELOPER SUPPORT



Get help porting OS/2 applications for  
Japanese, Chinese, or Korean.

Experienced guidance from the leading  
double byte character set OS/2 developer.  
Training or consulting on either an hourly or  
long term basis.



**MicroBurst, Inc.**

9035 Shady Grove Court  
Gaithersburg, MD 20877  
Circle #217

(301) 330-2995

Fax: (301) 330-8609

CompuServe: 70334,3616

Internet: 70334.3616 @  
COMPUSERVE.COM.

## DOT EXE

Perhaps most impressive, I feel that I've barely begun to exploit the extensive resources available. I've incorporated code written in old QuickBasic style into a graphical interface, developed data entry forms in relatively short order, and presented results graphically (through Realizer's charting features) with only four to six lines of code. I've only just begun to play with the reporting and database import functions, but Realizer looks like a valuable development platform for dBASE-style systems so long as you have another program, such as dBASE itself, to create and maintain the base files.

In short, CA-Realizer has become a valuable addition to my OS/2 Desktop—one that appears to have staying power. With Realizer I can quickly write custom programs, chart results, and get my work done in a fraction of the time I used to spend.

While Realizer programs cannot compete performance-wise with C, neither is the code particularly slow. Except for some of the most compute-intensive work (or extraordinarily large data sets that would bump up against 64kb array limits), Realizer should be plenty fast for general tasks. If those general tasks include programs for wide distribution, you can create stand-alone executables and save your users from the overhead of a full Realizer system.

When you weigh the productivity gains against potential performance hits, Realizer looks like a winner, and it deserves consideration as a standard corporate development tool for the OS/2 or mixed OS/2 and Windows environment. Even programmers who need a more robust environment may find it a valuable prototyping tool.

Of course, Realizer may need to overcome some long-standing prejudices against BASIC as a serious language (perhaps that's why CA veiled its BASIC roots when choosing the name Realizer). It's a stigma no longer deserved. This is not your father's BASIC. Realizer produces well-structured code and includes advanced tools critical to contemporary GUI development. Despite some rough edges, Realizer's advantages outweigh both its problems and BASIC's reputation. Further enhancements will be icing on the cake. ♦

# RDC Rexx Diagnostic Commander

## REXX Debugging Made EASY!

RDC allows software developers, administrators,  
and ALL OS/2 professionals to quickly and efficiently  
code and test REXX command files in a fully  
interactive environment.

- ♣ Full Screen Display
- ♣ Breakpoints
- ♣ Variable Display Service
- ♣ Variable Alteration
- ♣ Single Step Review
- ♣ Dynamic Watch Windows
- ♣ Logic Alteration
- ♣ Deferred Debug Option

*And RDC supports multi-platforms*



**Suitable  
Alternatives**

4655 Old Ironsides Dr., Suite 220  
Santa Clara, CA 95054

**Call (408) 727-3142, or FAX (408) 727-3170**

Available through OS/2 EXPRESS

Circle # 204



# Shoring Up the Data Defenses

For those backup systems that require the high speed or volume of a SCSI device, BackupWiz is one product that can be used to fend off a data disaster.

BY BRADLEY D. KLIEWER

**W**hen *OS/2 Professional* reviewed Sytos Plus for OS/2 back in March 1993, one of OS/2's greatest weaknesses was backup support. At the time, Sytron's Sytos was the backup tool of choice less because it was the ideal solution than because it worked reasonably well. Were it not for OS/2-specific features such as long file name support, many users may have been content to continue using DOS-based backup under OS/2.

Sytos has changed somewhat since that early review. It now supports more tape drives and Sytron has added new products to the line. Its Rebound option restores both the operating system and data (something that is not possible with Sytos alone because of its GUI-based design) should the boot drive fail. Another option, Repro, helps IS personnel set up new systems by restoring an entire OS/2 configuration from tape (Repro will restore a fixed number of systems and then the software "expires").

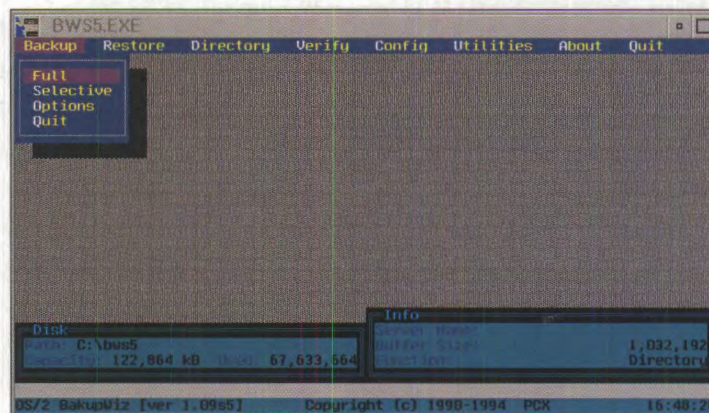
While Sytos has moved into new territories, other vendors have been shoring up the data defenses. They include MSR Development's BackMaster (see the April 1994 issue for additional information on this software for floppy-controller tapes), NovaStor's NovaBack (which, like Sytos, supports a broad range of tape and adapter formats), Parallel Storage Solutions (a hardware/software combination for backup through a parallel port—see the review in this month's *Hard Drive*, p. 53), and BackupWiz from PCX.

BackupWiz supports only SCSI-based tape systems, the prevailing standard in high capacity backup, or devices configured as logical drives (to transfer data to a host such as a LAN server, minicomputer, or mainframe). If you're looking for economical backup on independent low-data-volume workstations, you might be better off with either a floppy based controller using BackMaster or NovaBack, or an easily portable device (such as the one from Parallel Storage Solutions) that can be moved from system to system.

However, if your department needs the high speed or volume of a SCSI device (or enjoys the luxury of a host system with plenty of excess capacity), BackupWiz provides the defenses you will need in the face of disaster.

BackupWiz wisely eschews a GUI front-end in favor of a text-mode screen that can run on a bare-bones setup (for example, off the OS/2 boot diskettes should the hard disk become unusable). However, you will need to modify the boot diskettes to load the appropriate BackupWiz driver. In fact, you can save lots of frustration at failure time if you plan ahead and make a modified boot set when you first install BackupWiz.

PCX deserves commendations in two areas. First, in addition to specific tape device support, BackupWiz includes settings for generic SCSI devices in three flavors (SCSI 1, SCSI 2, and Dumb SCSI). When we brought in an Exabyte FS10G 8mm 10gb (5gb uncompressed capacity) tape drive last fall, Backup-



The BackupWiz main menu. Although it uses a text mode interface, the drop-down menu selection emulates a GUI environment—this is particularly valuable when restoring from a crashed disk.



Wiz was able to access the device even though it had no direct driver support (unlike Sytos, which simply refused to acknowledge a tape drive was available). Second, PCX supplies regular updates (thus far, every two or three weeks) through a BBS.

Lately, the updates have involved a few minor bug fixes and adding support for new tape systems and command line options. Back in November, when we started testing, the problems with the software were more severe, if not quite data-threatening.

Much to our chagrin, our first test of BackupWiz was a real-life failure. In late November a 1gb drive on our server died (right after Comdex, as our office was trying to deal with backlogs created by a full week of dawn-to-dusk convention activity). We replaced the drive with a 1.8gb unit and literally prayed that our untested BackupWiz restore would work from a tape drive that was not specifically supported.

The restore proceeded smoothly, and all seemed well until we started looking around the drive. Then, closer examination

revealed two problems. At first, we thought some files had not been restored. However, it turned out that BackupWiz had used some file names as directory names and placed the matching file (along with a seemingly random selection of other files from the same directory) within this new directory. Additionally,

a few of the files were restored with the file date set to the day we restored the files.

We also discovered that PCX had already found and fixed the problem. And fortunately, the integrity of the backup was fine. We simply downloaded a new copy of the software from the BBS, cleaned out the errant directories, and ran the restore again to recover the proper file names.

## The Partial Restore

Full drive restores are the simplest. A more demanding test of any backup software is a partial restore—for example, accidentally deleted files or directories. Ideally, to do the procedure I'd like to select directories from a tree view, apply file masks (e.g., include \*.d\* and exclude \*.dat), click on the files I want, and begin the restore. With BackupWiz, I must manually enter the file

and/or directory masks without the benefit of a tree view. I must then note the files I want to restore, and then request a restore operation, retyping the file names I just found.

Overall, however, I prefer the BackupWiz interface to the Sytos Plus interface, particularly when restoring files. Sytos procedure files, while very useful for automated backup tasks, impose a certain awkwardness in interactive use. BackupWiz, on the other hand, feels as though it were designed for interactive use.

Interestingly, you can develop BackupWiz as an automated system. As you select interactive options, you can save the settings to a configuration file. By saving configuration files with different names, you can design a system callable from a command line interface that resembles a procedure-based program such as Sytos.

Missing from the scenario, however, is a scheduler. Curiously, BackupWiz omits such a utility. Scheduling options abound, however. You can set basic scheduling tasks through the OS/2 Alarms applet, use scheduling utilities shipped with a product you already own (such as the Timer program that comes with the PMComm communications program), download scheduling utilities from the PCX BBS system, or for the most demanding needs purchase a robust scheduling system such as ATS for OS/2 from MHR Software and Consulting or ECS by Vinzant, Inc. (both reviewed in the January 1994 issue of *OS/2 Professional*).

Efficient drivers complement the simple interface. When writing data to the Exabyte 8mm tape drive, we averaged throughput of 28mb/min. Those are the fastest times we have yet clocked. Of course, the Exabyte hardware deserves credit for much of that performance.

In any case, before you choose your software platform, you may first want to consider your hardware choices. If it turns out you choose SCSI (or logical drives on hosts), BackupWiz offers a reliable, efficient, and reasonably easy-to-use backup system. It has saved our data once already. We can only hope we don't need it again. ♦

### BackupWiz

PCX  
3525 Del Mar Heights  
Road, Suite 313  
San Diego, CA 92130  
(619) 259-9797  
fax: (619) 481-6474

**LIST PRICE**  
\$149





## HARD DRIVE

*Adventures in gear for the OS/2 Professional*

# A Storage Solution

If your quest is for a universal hardware backup system, the solution may be PSS's line of integrated backup units.

BY BRADLEY D. KLIEWER

**W**hen OS/2 2.0 first appeared, many users complained about the dearth of native OS/2 backup software. Fortunately the problem has been fixed—you now have several packages to choose from (see DOT EXE on page 51 for a review of one such product).

You also have a number of hardware technologies to choose from. On the low end, a floppy-controller small format cartridge is both cheap and effective, if not particularly fast. On the high end, most vendors have abandoned proprietary adapters in favor of the widely adopted SCSI standard. Of course, "widely adopted" is far from "universal"—an issue that can thwart a plan to share a single (expensive) high-end device among several departmental computers.

Parallel Storage Solutions addresses this issue with its line of integrated backup units that work through your system's parallel port. At the core of the PSS technology is a parallel-to-SCSI cable that connects a SCSI-based tape device to the universally available parallel port. You may then choose from a variety of drives including 4mm DAT and QIC quarter-inch. PSS includes both hardware and proprietary software (called SDB) in the package. (In addition to OS/2, versions are available for DOS, Windows, and SCO Unix.)

Each PSS drive console has a handle on the top. Once you have installed the software, you simply carry the system from machine to machine, plug in the parallel port (and the power supply), and back up the data. In the course of our evaluation we discovered an additional advantage to the parallel interface—it's ideally suited to backing up a laptop.

With the 4mm DAT unit we reviewed, backup throughput averaged about 9.25mb/min—a very respectable showing, given that PSS is cramming that data through a parallel port (last year's tests of Sytos/QIC systems yielded throughput averages in the 2-4mb/min range).

SDB also supports direct SCSI connection for ASPI-sup-

ported drives. However, we could not get this option to work on our test system. When we switched to BackupWiz for a direct SCSI connection, we achieved a throughput of 11 mb/min. So the parallel port option is a viable alternative even on SCSI-enabled systems.

My greatest concern before using the SDB software was its proprietary nature. Would this be yet another case of inferior software resulting from the NIH (Not Invented Here) syndrome? Thankfully, the answer was, "No." SDB rates among the best of the backup software programs I have used.

The text-based menus are simple and intuitive. And, as with the other backup options available under OS/2, the more common options (such as full backup of all drives) are available as pre-written procedures that may be invoked through icons.

The restore works either by file name specification or through a convenient point and shoot method. The software displays a directory tree, and you then either mark directories or view files and mark only the specific files you want within the directory. This is the way all backup/restore procedures should work.

PSS is not resting on its laurels. By the time this review sees print, it should be shipping a new product called Quick/2 Install. The package includes three bootable diskettes and a tape cartridge with the OS/2 operating system. At the April OS/2 Technical Interchange in San Francisco, PSS was demonstrating a full OS/2 installation from tape that finished in under 15 minutes.

I had only one minor problem with the hardware itself. The power seemed to cut out every once in a while when the power

### PSS

Parallel Storage Solutions  
116 S. Central Ave.  
Elmsford, NY 10523  
(800) 998-7839  
fax: (914) 347-4646

#### LIST PRICE:

PDS-2 (4mm DAT):  
\$2,995  
PSS-2000 (QIC 2gb):  
\$2,695

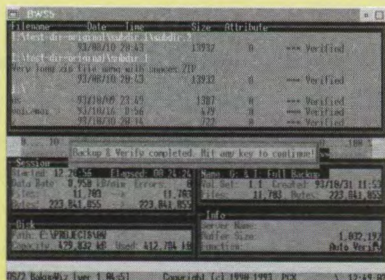


Introducing...

# BakupWiz



OS/2 BackupWiz is the SCSI tape backup solution you have been looking for! Designed to exploit OS/2's multiple threading, BackupWiz gives you a quick and reliable method to completely back up your OS/2 system. HPFS and FAT file systems are supported and Extended Attributes, Long File Names, System files, and the Workplace Shell are backed up. You can even restore your entire OS/2 boot volume from tape!



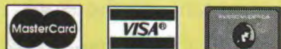
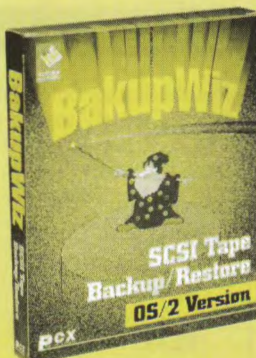
Ease of use is another of OS/2 BackupWiz's strong points. A simple, character oriented interface allows for easy file selection on both backup and restore. No more complicated and awkward menu structures to navigate. Command line operation

ability is another plus. OS/2 BackupWiz comes with support for most 1/4", 4mm (DAT), and 8mm tape devices. There is even a version of OS/2 BackupWiz that supports many of the automatic tape changer mechanisms. Any SCSI host adapter that has an ADD driver can be used with OS/2 BackupWiz.

PCX also works hard to keep you satisfied after the sale with outstanding customer support. Being a small and aggressive company means that we can respond to your needs that much quicker. When new tape drives

become available, PCX adds support for them in a matter of weeks, not months.

OS/2 BackupWiz is priced at \$149 (autochanger version \$399). Ask us about our competitive upgrade prices and hardware/software bundles! We offer a 30 day money back guarantee to protect you in case OS/2 BackupWiz does not work for you! Call our toll free number and order today!



FOR MORE INFORMATION OR TO ORDER CALL:

## 1-800-800-4PCX

**PCX**

3525 Del Mar Heights Road, Suite 313, San Diego, CA 92130  
(619) 259-9797 • (619) 481-6474 FAX

## HARD DRIVE

cord was moved. A call to PSS revealed that some of the early power cords did not fit the drive properly. I found another power cord to use as a replacement and the problem disappeared.

PSS has an impressive lineup of tape backup solutions for the OS/2 (or cross-platform) user. Not only is the hardware suitable for a wide range of systems, but the software ranks among the best available under OS/2. The biggest disadvantage is that the software is not sold without the hardware—otherwise we'd recommend it as an option for those with an existing base of backup hardware. ♦

### Backup Tape Formats

**QIC data cartridges** have a long history. Early QIC systems stored about 60mb of data on a tape; today, typical QIC capacities range from 525mb to 2gb. *Advantages:* historical persistence and interchangeability (you can continue to use lower capacity tapes in higher capacity drives). *Disadvantage:* physical size—QIC cartridges are by far the largest of the four options.

**QIC mini-cartridges** are the most economical alternative for dedicated drives on individual workstations. But they're having trouble keeping up with ever-growing drive capacities. *Advantage:* cost. *Disadvantages:* slow speed and the need to format tapes before use (preformatted tapes are available).

Their compact size and relatively high capacities (in the 1gb range, uncompressed) make **4mm DAT cartridges** a convenient option. As a digital medium originally designed to locate musical tracks, DAT provides rapid random access, which means improved restore times in a selective (partial) restore. *Advantages:* high speed and capacity and compact size. *Disadvantages:* limited upward capacity growth and lack of interchangeability with QIC systems.

**8mm data cartridges**, based on the popular Hi8 video camcorder technology, offer higher capacity and the fastest speed of all four tape technologies (two to three times faster than QIC and DAT). The widespread acceptance of Hi8 video should help keep tape prices low. *Advantages:* speed and capacity. *Disadvantages:* a smaller installed base and higher hardware cost.

From a technological standpoint, we prefer the 8mm format, especially in high volume environments such as networks. From a practical standpoint, we still favor the QIC systems, particularly the larger format. With a much larger installed base and better interchangeability, QIC will probably remain the leading technology in the corporate environment. ♦





# The View from Provo

Novell's new NetWare Client for OS/2 software is off to a fast start. It's stable, easy to install, and reasonably transparent to use. In fact, your greatest challenge may be getting your hands on a copy of it.

BY WAYNE RASH JR.

**I**t's outselling the client software for Windows and DOS!" Jeff Turner said. He was sounding slightly amazed. Turner, Novell's product line manager for NetWare Clients, was discussing the success of the Utah-based networking giant's latest release. His report: since it was released in April, the NetWare Client for OS/2 2.1 is selling faster than any other client software that Novell markets.

The Novell NetWare Client for OS/2, available from Utah-based Novell, a Novell reseller, or from Novell's NetWire forum on CompuServe, is a replacement for Novell's venerable OS/2 Requester. The Requester has been around in one incarnation or another since the earliest days of OS/2, but it never found a lot of favor among end users. The product was hard to install, less than completely intuitive to use, and it was—to be charitable—less than completely stable. During tests of the last version of the Requester, for example, forays into hex dumps became depressingly frequent.

That's all changed now. Novell's new Client for OS/2 appears to be stable, easy to install, and reasonably transparent to use. In fact, the biggest challenges are likely to be getting your hands on a copy and preparing the software for installation.

## What You Get

The NetWare Client for OS/2 appears to follow the design philosophy used in the company's recently released NetWare Client for Windows. These products are designed so that they can be used exclusively from within their respective GUI environments. As long as they're attached to a network with an active NetWare file server, the process of logging into the network need not take you out of Presentation Manager.

To log into NetWare, you click on the NetWare icon on the OS/2 desktop. The icon opens to show you the attached file

servers, and you click on the one you want to use. If you haven't already logged into the file server, you'll get a dialogue box that will ask for your user name and password. Once you supply those, you're in. The NetWare Client for OS/2 will let you log into multiple servers at the same time.

Once you're in, you have access to file and print services just as NetWare users in the DOS and Windows environments do. In OS/2, this means your NetWare directories look just like any other disk directories available to your machine. If you have OS/2 support loaded on your NetWare file server, you can use OS/2-specific services such as long file names. However, you don't need to have NetWare OS/2 services running to access the file server or other services on the network.

## Getting Started

The fastest way for most users to get Novell's NetWare Client for OS/2 is to download it from CompuServe. To do this, go to the NetWire forum area (GO NOVFILES) and follow the instructions for downloading client software. One of the client packages offered is the NetWare Client for OS/2. The download process will require you to request five different files, the names of which the instructions will give you.

You'll need to be prepared to transfer about 2 1/2 megabytes of data in those five files. The time (and thus the cost of CompuServe) depends on how fast your modem is. At 14,400 bps, it took me about 37 minutes to download the files.

Once you get the files, you'll need to gather five blank high density diskettes and label them according to an instruction file that you'll also have downloaded from NetWire. Once you do that, the next step is to extract them (they're self-extracting .EXE files; simply run them as you would any executable) to the floppy diskettes.



## CONNECTIVITY

The extracting process would have been less painful if the instructions were right. Unfortunately, at press time, the Novell instructions that go with the files you're supposed to extract are wrong, apparently written for users of a different extraction scheme than the one actually delivered. Novell says that this problem should be corrected by the time you read this.

If you're using an OS/2 machine to download the information from NetWare and it's the machine you're going to be using on the network, you can also install the NetWare Client directly from your hard disk. In fact, if you have an operating version of an earlier NetWare Requester, you can even install the new client from a network drive. Whichever method you use, the installation process requires only that you know the type of network interface card that's installed in the computer, and from that be able to figure out the name of the network driver software.

When we installed the Client on a system using an Intel EtherExpress 16, for example, we had to decipher and choose the EXP16ODI.SYS driver. Cards from 3Com have names like "3C503ODI.SYS" so it's not all that difficult to figure which one you need, and the Novell installer lets you

scroll through a list until you decide.

Beyond specifying the proper network interface card, most of the installation consists of confirming choices, such as the name of the directory you want NetWare to use, whether you want it to change your CONFIG.SYS file, and whether you want the installer to add support for the DOS box and WIN-OS/2. The only other hard part of the installation process pops up only if you're not using the default settings that Novell expects you to use. In that case, you may need to edit a network configuration file, and if you're not skilled at that level of NetWare interaction, you might want to have a trained network administrator do it for you.

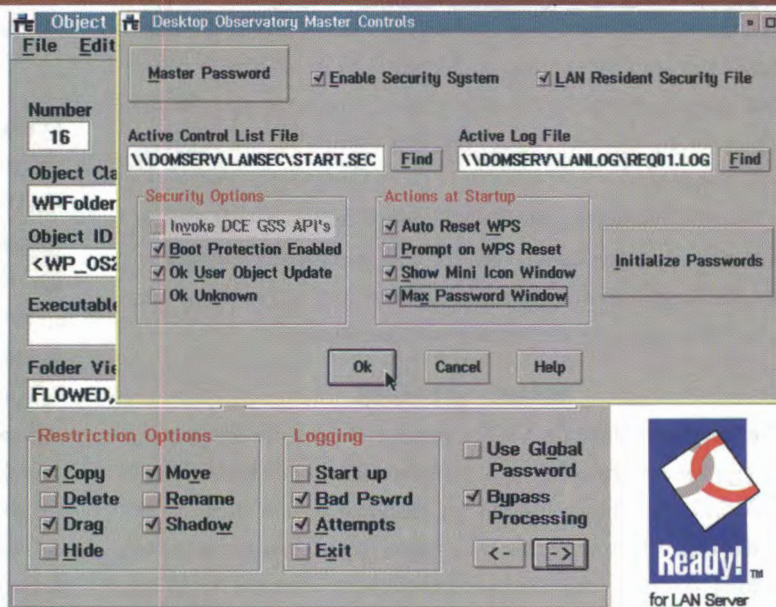
If you do install DOS and Windows support, you may need to change a few parameters in the DOS Notebook. If that turns out to be the case, the installer will tell you which parameters and to what they should be set. Once you've completed the installation, all you need to do is reboot the computer and you're ready to use NetWare with the new Client for OS/2.

At our test bench, the installation of this product and its subsequent use were surprisingly uneventful. Once it's installed, all you need to do is log on. Unlike some earlier versions of OS/2

# Desktop Observatory

Desktop Control  
&  
Security

- Builds an **instant** Desktop anyway you want it and anywhere you want it in **seconds**.
- Perform **maintenance** on client Desktops from **any machine** attached to your network.
- **Password protect** folders, programs, and even what files a program can process.
- Setup **mobile** Desktops and security or standardize an entire network with **one** secure Desktop.
- Apply **restriction settings** to objects so they cannot be moved, copied, deleted, renamed, or seen.
- Starts your own **REXX** or **C** utilities when folders or programs open or close. Great for selective backups, statistics, copying files from the server, or positioning windows. Let your imagination be your guide.
- **Unlimited** objects and configurations.
- **Boot protection** protects against unauthorized access from a floppy diskette.



Runs on all network operating systems.

800-525-1650

Pinnacle Technology Inc.  
P.O. Box 128  
Kirklin IN 46050

PINNACLE

(c) Copyright 1993 Pinnacle Technology Inc.





## CONNECTIVITY

workstation software from Novell, this product simply worked. It's seamless, appears to be robust, and it offers a number of added capabilities beyond earlier software for OS/2 from Novell.

### New Features

Jeff Turner said the Novell client provides full support for all versions of OS/2 2.x. According to Turner, this means that network administrators need to maintain and administer only one version of their client software, rather than a different version for every ver-

sion of OS/2. Turner noted that the new client works properly with OS/2 2.11, a statement we confirmed by testing it on that version.

An important change for corporate users is that the NetWare Client now supports remote boot services. This means you can have a diskless workstation boot OS/2 directly from the file server. This, in turn, means that corporate cus-

tomers can eliminate the security hole presented by workstation disks.

Equally important is the support now included by Novell for multitasking and DOS and Windows sessions. According to Turner, every session running under OS/2 can now have its own network session using NetWare. Likewise, a WIN-OS/2 session or a session in the DOS box can have access to NetWare for the full range of network services.

Another feature that Novell is particularly proud of is the inclusion of electronic documentation in native OS/2 format. This saves a few trees, and allows the NetWare documentation to be a part of the OS/2 Bookshelf.

### High Demand

One result of the improvements to the NetWare Client for OS/2 is strong demand for the new product. According to Turner, Novell is selling "significantly" more copies of the Client for OS/2 than it is for the Windows and DOS product. Turner says he thinks this indicates not only that people are buying OS/2 but

*continued on page 66*



**Call Now  
To Get The Right  
Fax Solution  
For Your  
Local Area Network  
(602) 327-1357  
or FAX (602) 321-7456**



## The Right Fax Solution For Local Area Networks

RightFAX is an advanced network fax solution for multi-platform LANS that provides the flexibility and convenience of faxing directly from any workstation on the network. RightFAX is scalable to any size network, provides E-Mail integration and meets the power and speed requirements demanded by today's corporate environment. RightFAX, the right solution for your fax needs.

### NETWORKS SUPPORTED

- ▲ IBM LAN Server 1.3 or better, Microsoft LAN Manager 2.x., Novell NetWare 2.15c or better

### CAPABILITIES

- ▲ Presentation Manager (OS/2), Windows, and DOS user interfaces included
- ▲ Up to 32 channels per server
- ▲ Unlimited users; licensed per phone line
- ▲ Automatic backups at specified times
- ▲ Automatic deletions of faxes older than a specified date
- ▲ Record exporting for all sent and received faxes along with billing codes and transmission histories into any spreadsheet or database
- ▲ Client/Server design with a multi-threaded database server that allows the fax server to handle many clients
- ▲ 32-bit PCL-5 conversion engine for fast fax processing (optional 32-bit PostScript engine available)
- ▲ Automatic Inbound Routing (DID, DTMF, Manual, Line, OCR)
- ▲ Optional server based OCR
- ▲ Optional cc:Mail, Lotus Notes, Microsoft Mail and MHS gateways

©Copyright 1990-1994 Cracchiolo & Feder, Inc. All rights reserved. All products mentioned are registered by their respective companies.

A Product of RightFAX, formerly Cracchiolo & Feder, Inc.,

4400 East Broadway, Suite 312, Tucson, Arizona 85711 U.S.A.

Circle #176

Available through OS/2 EXPRESS



# LOOK WHAT'S IN STORE FOR OS/2...



Great prices.  
Great selection.



1-800-776-8284



1-800-274-6611

**COMPUSA**  
THE COMPUTER SUPERSTORE™

**EGGHEAD SOFTWARE**  
North America's Software Eggsperts.  
1-800-Egghead

**OS/2 EXPRESS**  
1-800-OS2-KWIK

**MICRO CENTER**  
THE COMPUTER DEPARTMENT STORE®

**PROVANTAGE**  
1-800-336-1166

**MicroWAREHOUSE**  
1-800-367-7080

**The Corner Store**  
1-800-I-BUY-OS2

- ➔ **BackMaster 1.01**  
MSR Development  
The 32-bit QIC 40/80 tape backup utility for OS/2 2.1. \$79.95
- ➔ **Computer Associates**  
CA-Realizer 2.0—The robust BASIC language now for Windows and OS/2. \$99  
CA-Superproject 3.0—Powerful Project Manager now for Windows and OS/2. \$149 (Comp Upgrade)
- ➔ **DeScribe® Word Processor 4.0**  
DeScribe, Inc.  
First & Best 32-bit Graphical OS/2 Word Processor. \$495, \$139 (Comp. Upgrade)
- ➔ **Globalink**  
Power Translator Professional for OS/2  
Translates Spanish, French, and German files to and from English with a 90% accuracy. \$1195
- ➔ **Hilgraeve**  
HyperACCESS/5—Award-winning communications software for file transfer, terminal emulation, and remote control. \$199  
KopyKat—Fast reliable graphical remote control software for OS/2. Supports LANs and Modems. \$199 (includes two licenses)
- ➔ **LinkRight**  
Rightware  
Parallel port and serial port file transfer utility made especially for OS/2. \$119 Upgrade, \$189 Full
- ➔ **Lotus SmartSuite for OS/2**  
Lotus Development Corporation  
The only complete solution for OS/2 desktops. SRP—\$595 Upgrade, \$795 Full
- ➔ **MEDIAscript OS/2 Special Edition**  
Network Technology Corporation  
Powerful multimedia tools which support PM windows and controls, and MMPM/2 digital audio, video, and animation. \$395
- ➔ **PCMCIA Data/Fax Modems**  
Apex Data, Inc.  
High Speed Data/Fax Modems—cellular capable and includes OS/2 Drivers with every modem. \$329
- ➔ **Performance 2.1 PLUS**  
Clear & Simple, Inc.  
New Release! A Tuning & Utility Kit; book + 40 REXX programs, bonus 3000 OS/2 Icons. \$39.95
- ➔ **Person to Person/2**  
IBM Corporation  
Real time data conferencing and annotation. \$288 each—\$1875 for 10-pack.
- ➔ **SkyScraper Desktop Manager for OS/2**  
Binar Graphics  
The first desktop manager that lets you run all your applications full-screen at the same time, each one on its own virtual desk, and switch between them instantly with a single mouse click. \$99.95

Prices shown are manufacturer list prices, specials and discounts may be available.  
All products may not be in stock at all stores, be sure to ask for availability.

Sponsored by the OS/2 Vendor Council—Dealers, Retailers, Mail Order Inquiries Welcome. Call (203) 658-1204.

Circle #182





**MARKETLINE**

*Product News for the OS/2 User*

## SCOOPS

# OS/2 Installation for Dummies

A quick and easy OS/2 installation method is finally available thanks to a new installation tool just released by Parallel Storage Solutions (PSS). This new product, QUICK/2-INSTALL, completes the installation process and automatically reconfigures the system in less than 15 minutes, using three diskettes and one quarter-inch cartridge. Currently, the cartridge works

only in conjunction with PSS's line of tape drives.

In essence, QUICK/2-INSTALL is a licensed copy of OS/2 version 2.11 in the form of an installation utility. The product is geared toward the corporate IS community, which often needs to install multiple OS/2 systems in as timely a fashion as possible.

The QUICK/2INSTALL process begins with three

3 1/2-inch diskettes that are used to boot and format the drive. A complete version of OS/2 is then installed via parallel port from the QIC tape. The product installs all drivers currently available for OS/2, as opposed to the traditional method of selectively installing only those needed for existing hardware. This eliminates the need for installing new drivers when

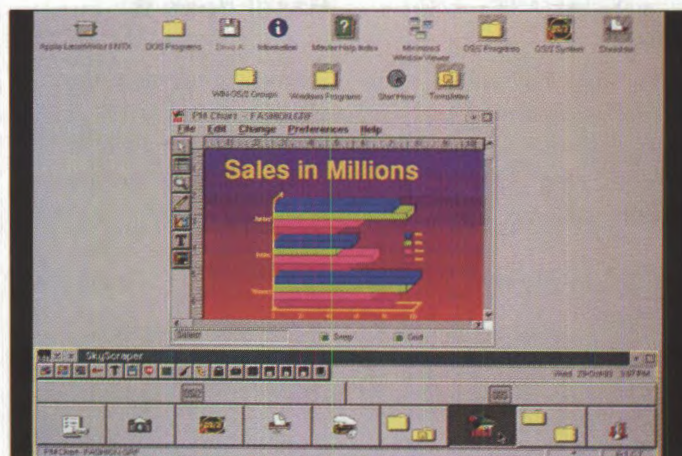
upgrading hardware.

The development time for this product was a mere six months from start to finish. The company hopes to have several thousand copies shipped by the middle of this month, primarily to its existing base of backup drive users. For more information, PSS can be reached at (914) 347-7044.

## New Products

### Now you see it

Desktop clutter be gone! That's the cry heard from Binar Graphics, Inc., developer of SkyScraper Desktop Manager for OS/2. This productivity tool organizes the OS/2 desktop by providing a visual representation of the system's multitasking capabilities. Users can run multiple applications, all of them maximized on individual desktops. Users can switch between full-screen applications by clicking on a corresponding button located on a configurable floating toolbar. Launching DOS and OS/2 text sessions is simply a matter of dragging an icon onto any of the desktops. This tool is priced at \$99 and is currently available through retail channels or



*Binar Graphics' SkyScraper is a virtual desktop manager that reduces desktop clutter and makes it easier to get work done.*

directly from the company. Binar Graphics, Inc., 30 Mitchell Blvd., San Rafael, CA 94903-2034, (415) 491-1565, fax (415) 491-1164.

### Novell's Client

Novell, Inc. has shipped its NetWare Client for OS/2 2.1.

The new client kit features full support for OS/2 2.x, including the latest 2.11 maintenance release. It includes a remote boot capability that enables users to boot OS/2 workstations from a NetWare server. The product also features an improved client

installation program that can automatically configure a system to run both IBM LAN Requester and Novell's NetWare Client for OS/2.

The NetWare Client for OS/2 version 2.1 is available to customers at no charge on NetWare and from resellers for \$99. Novell, Inc., 122 E. 1700 South, Provo, UT 84606-6194, (800) UPDATE1, fax (801) 377-7619.

### Welcome back

Symantec Corporation has reentered the OS/2 marketplace with a new backup product that has extensive device support. Fastback Plus for OS/2 is a 32-bit application that takes full advantage of multitasking. It allows users to



## MARKETLINE



Symantec's Fastback Plus is designed for both the new and experienced OS/2 user.

back up two different drives to separate tape drives, while continuing to work in an application. Users may also define how much processing time is allocated by selecting one of three levels of CPU usage. Other features include a three-level interface for both novice and advanced OS/2 users, a quick backup speed of up to 28mb/minute, and scheduling capability for running unattended backups. Fastback Plus requires OS/2 2.0 or later and supports floppy disks, QIC 40/80 tape drives, SCSI tape drives, and Bernoulli boxes. The product can also back up to network drives. Cost: \$189. Symantec Corporation, 175 W. Broadway, Eugene, OR 97401, (800) 441-7234, fax (503) 334-7466.

### Our records indicate

Capstone Software, Inc. is now shipping SpaceMap 1.1 for OS/2, a utility program that summarizes disk space usage by directory, including

space used by subdirectories. Space usage is displayed numerically, by percentage, or in the form of a bar chart. Usage reports can be generated, printed, or saved to a file. The program also allows users to copy, edit, move, or erase files as needed; it works with various disk formats including FAT, HPFS, and CD-ROM. The program, a 32-bit Presentation Manager program designed for use by individual users as well as LAN administrators, requires OS/2 2.0 or later and has a list price of \$59.95. Capstone Software, Inc., P.O. Box 416, Carmel, IN 46032, (800) 500-2244, fax (317) 848-2451.

### Testing 1, 2, 3

New England based Softbridge, Inc. has released the latest version of its Automated Test Facility (ATF), a software system for testing client/server applications written under OS/2 and Windows. ATF 3.0 is geared primarily toward corporate and institutional users, including

systems integrators and hardware developers working in a client/server environment. The product features a capture/play-back capability that enables even the non-technical user to create tests. ATF also sports full scripting language, which allows the more experienced user to develop complex programmatic test cases.

Working with ATF, users can incorporate legacy system testing through its support for 3270 terminal emulation. Pricing starts at \$18,000 for the first workstation; additional workstations are approximately \$2,000 each. A typical ATF system runs \$25,000-\$30,000. Softbridge, Inc., 125 Cambridge Park Drive, Cambridge, MA 02140, (617) 576-2257, fax (617) 864-7747.

### Easel does it

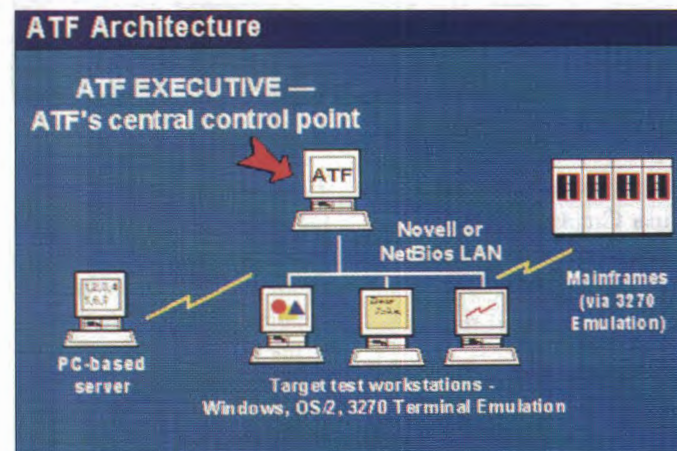
A new client/server development environment is now available from Easel Corp. ENFIN Release 4.0 is an application development workspace in which object

icons are color coded and organized by functional group. The new release includes a Main Desktop Apprentice feature that provides on-line training for developers who aren't completely comfortable with the drag-and-drop environment. Other features include an SQL editor, an interface that supports all 3270 terminal emulators, and on-line documentation. The OS/2 SQL version starts at \$5,995; the corporate edition is \$10,900. Easel Corp., 25 Corporate Drive, Burlington, MA 01803, (617) 221-2100, fax (617) 221-3099.

### Calling all platforms

KnowledgeNet Inc. has developed Net/WrkOS/2, a communications package that allows users to communicate across differing hardware platforms. The product also provides integration with AS/400, RS/6000, System/36, and HP based platforms running KnowledgeNet's other Net/Wrk products. Users can transfer files and execute programs from remote sites. The product also supports Dynamic SQL and enables users to access and update subsets of data on a remote workstation. Other features include a Net/Wrk Status Monitor for displaying current system activity, a "communications history" capability used to review communications sessions, and on-line help. The package is priced at just under \$1,500. KnowledgeNet Inc., 1260 W. Northwest Hwy., Palatine, IL 60067, (708) 705-0400, fax (708) 991-4039.

*ATF can test realistic client/server scenarios for common conditions such as concurrent requests and lockout as well as for more complex cases where the results of one user's activities trigger the tasks of others.*





# News

## What are they up to?

DeScribe, Inc., in spite of its recent restructuring has been at work on a variety of projects, including a voice-enabled version of its word processor and a suite of office applications.

In an interview with Allan Katzen just weeks before he left the company, the former president said that DeScribe's first priority is to ship the upgrade to its wordprocessor, DeScribe 4.0. The new release, DeScribe 4.1, should be ready to go by July 1 at a cost of \$495. It is expected to address the number one complaint about the word processor—a lack of true footnotes—while also offering several new features.

Version 4.1 will include new spell check capabilities, such as a "proper names" list and an "initial spell" feature that will enable users to utilize drag-and-drop replacement for misspelled words. It will also feature an equation editor that the company has licensed from a third-party vendor.

Meanwhile, the company will continue to work on the voice-enabling of its word processor. When this product finally ships, sometime in the second half of this year, it will include support for IBM's two speech products, the Continuous Speech Series and the Personal Dictation System.

Beyond standalone word processors, DeScribe also hopes to deliver the suite of applications it has been developing by the first quarter of 1995. Code-named Magnum, the project consists of a component shell that will manage DeScribe's word processor, a spreadsheet, a mail program, and a database access system for SQL and non-SQL databases. Katzen says the project is still "in an early planning stage and very little code has actually been written." One issue the company hopes to address with Magnum is the redundancy of functions prevalent in existing suites, such as spell checkers, text format functions, and menus, by placing these common features into a shell, thereby allowing for universal access across applications.

## Visual Document nears "first ship"

IBM's new client/server document management application, currently in beta test, is expected to ship to selected accounts for on-site testing by the end of this month. The product, Visual Document Library, will enable users to create documents that can include spreadsheets, graphics, audio, and video. Documents are stored as OS/2 files and can move across a LAN Server 3.0 or NetWare 4.0 network, enabling a user to access a

document without the originating application. Visual Document Library will also allow users to employ several different search techniques.

The on-site testing is part of IBM's late beta "First Customer Shipment," a policy that has been in effect since last year, according to Warren Taylor, IBM's U.S. marketing and services brand manager. The product should become GA within 90 days of going FCS.

## Lotus rolls out OS/2 upgrades

Lotus Development Corp. last month began to ship the upgrades to its OS/2 versions of 1-2-3 and Freelance Graphics, as first reported by *OS/2 Week*. The upgrades began shipping shortly after Lotus's announcement at the PSP Technical Interchange in San Francisco. The upgrades have been shipping both as standalone products and as components of the updated SmartSuite release 1.1. Both new releases are CID-enabled, facilitating installation across a network. They are also VIM-enabled, which ensures e-mail compatibility with other applications incorporating the VIM standard.

Lotus had originally hoped to ship 1-2-3 2.1 and Freelance 2.1 last February when it released an upgrade to Ami Pro 3.0, its word

processor. Existing SmartSuite for OS/2 users, as well as users of its current components, can upgrade by way of an Update kit. The kit is available for shipping and handling charges by calling (800) TRADE-UP, x9686.

While Lotus makes progress in fine-tuning its OS/2 apps, similar progress is harder to discern in their marketing, which is being handled by IBM. In fact, discussion on the boards and among our readers betrays a widespread dissatisfaction with Big Blue's lackluster marketing tactics. Privately, some Lotus execs have also expressed concern. One told *OS/2 Week*, "We'd like to see IBM take a more aggressive role in the marketing of OS/2."

Ironically, while IBM, which now controls marketing for all Lotus products for OS/2, has been essentially silent about the product for some time, Lotus has been actively promoting the SmartSuite for Windows with store demos and extensive ad campaigns. ♦





For additional information about an advertised product or service, circle the number. When you circle a number, you not only gain access to valuable information, you demonstrate to the advertisers that their support for OS/2 Professional gains them an important visibility in the OS/2 market. To subscribe, check the subscription box, and fill out the qualifying information required to fulfill all subscription requests.

ADVERTISER	PAGE	NUMBER	ADVERTISER	PAGE	NUMBER
Ariel Design .....	49	170	OS/2 Professional CD-ROM .....	71	.....
BIX .....	8	142	OS/2 Express .....	B-3	.....
CorelDRAW .....	72	5	OS/2 Express/PC Expo .....	68	.....
Describe .....	44	7	PCX .....	54	123
Essex Systems .....	67	101	Parallel Storage Solutions .....	6	113
Footprint .....	18	62	Pinnacle Technology .....	56	88
Globalink .....	4	104	Reply .....	39	208
IBM Personal Software Products .....	46	.....	RightFAX .....	57	176
IBM Personal Software Products .....	23-25	.....	SAS .....	14	.....
LapTop Solutions .....	18	193	SofTouch Systems .....	22	98
MSR Development .....	38	33	Solution Technology .....	66	220
MicroBurst .....	50	217	Suitable Alternatives .....	50	204
NovaStor .....	44	209	Syntegration .....	67	197
Objects++ .....	45	112	Sys Ed .....	66	190
OnDemand .....	10	216	Vendor Council .....	58	182

## INPUT

*continued from page 13*

Development Manager PDM and not MAPICS Product Data Management PDM.

**Mary C. Milliron**  
Keene, New Hampshire

*I couldn't agree with you more about the explosion of acronyms, particularly in the computer industry. The acronym IPDS (IBM Personal Dictation System) is IBM's.—Assistant Editor Claude d'Hermillon, Jr.*

### Be wary of the well-meaning

Your April editorial [Publisher's Memo] asks, "Is our government to be less capable than the bad guys across the sea?" My answer is a resounding yes, absolutely! We have a limited government that has to play by strict rules for a good reason: a too powerful government cannot be trusted.

Perhaps you've seen this quotation: "Experience should teach us to be most on our guard to protect liberty when the government's purposes are beneficent. Men born to freedom are naturally alert

to repel invasion of their liberty by evil-minded rulers. The greatest dangers to liberty lurk in insidious encroachment by men of zeal, well-meaning but without understanding." Justice Louis D. Brandeis, dissenting, *Olmstead v. U.S.*  
**Paul Williamson**  
*via the Internet*

### To stack or not to stack?

Recently I have been considering the purchase of Stacker for OS/2 and DOS to be installed on a TI notebook PC. I read Ken Mackin's review of this product [DOT EXE, December] and the subsequent response printed in the April issue [Letters], written by Kevin Bohacz.

I'm confused. Is Stacker a hazard to my files or not? What version of Stacker did you review for your article, version 1.0 or 1.1? If 1.0, have you tried version 1.1 and what are your impressions?

**John E. Temple**  
Clay Center, Nebraska

*We tested version 1.0. The program was used daily for four months on two machines*

*and showed no problems during that time. I caution everyone to back up their machines completely before installing any compression or disk-altering software. With hundreds of different brands of PCs, it is impossible to test every software and hardware combination. I recommend Stacker, but I'd never install it or any other system-level product without a secure back-up in place. After all, it's your data.—Ken Mackin*

### On Jerry on documentation

Jerry Pournelle's column [The View From Chaos Manor, April] complains about the documentation included with OS/2. The documentation was indeed deficient with OS/2 version 2.0, but the situation is substantially better with version 2.1. Pournelle states that the OS/2 manuals (his plural) don't explain CHKDSK. He must have different manuals than I do, because the procedure he needed is fully explained on page 137 of the Installation Guide. While it might be nice if this information appeared in the "Using the Operating System" manual as well, the

*continued on page 67*





# THE IS NOTEBOOK

*Tips and Techniques for the OS/2 Professional*

## Doing More with Less

BY GORDON SCOTT AND GENE STEELE

**M**ost OS/2 desktops have at least eight megabytes of RAM. That's because OS/2 runs slower on systems with less memory. Nonetheless, there's still a substantial installed base of two- and three-year-old PCs with less RAM. If you are one of those who has to manage systems with less than eight megabytes that should be running OS/2, there are some things you can do to make your company's computing environment more congenial for those users.

First, let's make one thing clear: it is, most definitely, possible to run OS/2 on a system with only four megabytes of RAM. Most people who try this find that a 4mb system running OS/2 is so slow that they return to DOS or Windows and warn others away from trying it. But that doesn't mean it can't be done. If you have 486 machines with less than eight megabytes of RAM, the following tips and techniques will help to improve OS/2 performance to an acceptable level.

**Use a shareware alternative to the Workplace Shell such as MSHELL.EXE or TSHELL.EXE.**

- Acquire a copy of either MSHELL.EXE or TSHELL.EXE from your favorite OS/2 shareware source (a local BBS, an Internet FTP site, or an OS/2 CD-ROM available in software stores or catalogs).
- Copy the command shell program to the root directory of the drive you boot from.
- Open your CONFIG.SYS file in the system editor or another text editor.
- Locate the line SET RUNWORK-

PLACE=C:\OS2\PMSHELL.EXE.

- Change the path and file name so that it specifies the path and file name of your alternative command shell (for example, C:\MSHELL.EXE).
- Reboot your computer

Using alternatives to the Workplace Shell program can save you time and memory space. That's because the Workplace Shell consists of the OS/2 desktop, the folders, templates, and icons that you can manipulate to start programs or move data. MSHELL and TSHELL don't provide such services. Instead, these programs provide a list from which to launch or restart a program. Any command you can enter on an OS/2 command line can be launched as a program.

The most important advantage of these programs is that they require less memory to run. In a laptop or other memory-constrained system this could be the number one factor for improving performance.

What you lose is the look, feel, and drag-and-drop capability of the Workplace Shell. For some users, that's not much of a loss, but for others, it can be like losing a limb. If you want all the other benefits of OS/2 (separate sessions for your windows applications, multitasked DOS programs, improved protection) and don't mind a simplified environment, then you will find this technique useful.

These programs are available from any one of a number of shareware sources, including the Hobbes CD-ROM. Internet users can get these programs from the FTP site FTP.CDROM.COM. Look for TSHELL.ZIP in the directory

OS2/ALL/SYSUTILS and MSHELL.ZIP in the directory OS2/2\_X/SYSUTILS.

**Replace PMSHELL.EXE with the OS/2 command interpreter.**

- Open your CONFIG.SYS file in a text editor.
- Locate the line SET RUNWORKPLACE=C:\OS2\PMSHELL.EXE.
- Replace PMSHELL.EXE with CMD.EXE.
- Reboot your computer.

This provides you with a blank desktop and an OS/2 window. Although you will not see icons on the desktop when you first start the system, every window you minimize will appear at the bottom of the desktop screen. You can start any program available to your system by simply invoking it from the command line.

The OS/2 command interpreter is flexible enough that you can start any program from the command line—even DOS programs and Windows applications. You can't drag and drop icons, invoke pop-up menus, or tear off templates, but you can multitask, run multiple full-screen Windows sessions and windowed DOS and OS/2 sessions. In fact, if you intend to work in this environment for any length of time you can create your own text-based menu system.

Using CMD.EXE isn't a dead end street. If you decide you need the WPS features after all, you can enable them even after starting the system via CMD.EXE—simply type PMSHELL at the OS/2 command line. The regular



## THE IS NOTEBOOK

OS/2 desktop will replace the empty desktop and you'll find OS/2 working as normal.

### Turn window animation off.

- Select System setup from the desktop pop-up menu.
- Double-click on the System icon in the system setup folder. (OS/2 will display the System - Settings notebook.)
- Select the Window tab from the System - Settings notebook.
- Select the radio button in the Animation group box marked "Disabled."
- Double click on the system icon to close the notebook.

This eliminates the cosmetic window frames that expand or contract when you open or close a desktop object. These windows provide you with a visual cue that your action did, in fact, execute. By default, this setting is turned on when you first install OS/2. However, there are other cues (such as the hard disk light) that won't slow down your system's performance.

**Don't use bitmaps as backgrounds for your desktop or folders.**

**Don't install or use the multimedia features or system sounds.**

**Don't use the High Performance File System (HPFS) on any of your hard drive partitions.**

**Don't enable the UNDELETE feature.**

Avoiding bitmaps, sounds, and/or HPFS drives will keep your system's memory from filling up with unnecessary options. The UNDELETE feature actually makes backup copies of files in hidden directories, taking valuable space on the hard disk. None of these features are set by default, so unless you

have installed or modified your system in these ways, you won't have to change anything.

Note, however, that OS/2 will install the HPFS drivers even if you don't enable HPFS partitions on your system. The HPFS driver is the first entry in your CONFIG.SYS, and you can further save system resources by placing the word REM in front of the line

```
REM IFS=C:\OS2\HPFS.IFS  
/CACHE:64 /CRECL:4.
```

### Set the SWAPPER.DAT file to work from the partition with the largest amount of free space.

- Edit your CONFIG.SYS file.
- Locate the line SWAPPATH=C:\OS2 ...
- Change the drive and path to a location that has the most free space available to it.

This allows your system to work with the largest, most frequently used file in an OS/2 system with as little restriction as possible. Any system that is low on memory will wind up using extra space

in the SWAPPER.DAT file. This file holds data that normally goes in your system's memory. When the memory gets full, it puts some of the less frequently used data into SWAPPER.DAT. The file expands and contracts as necessary to compensate for any memory shortages.

For example, if you have 6mb free on your C: drive, but have 24mb free on your D: drive, set the SWAPPATH to any directory on the D: drive. If your system has only 6mb RAM and 6mb free disk space, OS/2 cannot use any more than 12mb in its working memory. By setting the swap file to drive D: in the previous example, the system's potential working memory is increased from 12mb to 30mb. ♦

*Gordon Scott and Gene Steele collaborated to bring you this information. Gordon and Gene both work for different divisions of IBM located in San Jose, California. Gordon can be reached via the Internet by sending e-mail to [gscott@stlvm22.vnet.ibm.com](mailto:gscott@stlvm22.vnet.ibm.com). Gene and his son operate a by-invitation-only BBS in the 408 area code.*

## Change of Address

If you've moved, let us know so we can keep your subscription coming. Please peel off and attach your old label, and fill out your new address.

OLD LABEL

### New Address:

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail to Subscription Dept., OS/2 Professional, 4604 Chicago Ave. South, Minneapolis, MN 55407-3500





BOOKSTAX

# MASTERING OS/2 REXX

by Gabriel F. Gargiulo, John Wiley & Sons, Inc., 417 pages, \$39.95

REVIEWED BY RICK COOK

Ignore the cover blurbs. This book will not teach you “how to create reports and applications” using OS/2’s version of the REXX language. Still less is it “for users and programmers.” But accept it for what it is and you may find it useful.

A better title might be *A Quick Introduction to OS/2 REXX—At Great Length*. This book covers only part of the language, doesn’t really show you what you can do with it, and does it in far more space than necessary.

All that said, the book provides a clear introduction to REXX for rank beginners. It will let you get your feet wet. And if all you want is a replacement for batch files, it may serve you very well. Despite some peculiarities here and there, I would have no qualms about giving this book to a novice who wanted to start learning REXX.

REXX is usually described as an expanded version of the MS-DOS batch file. Actually it is more nearly the equivalent of perl in Unix. Which is to say it is a serious, if somewhat odd, programming language that lets you do some pretty remarkable things with the operating system and applications. Personally, I think REXX is one of the best things about OS/2, right up there with multitasking.

In order to tap all that power, though, you have to learn REXX—and this takes some doing. REXX has the complexity that is inherent in a powerful language (for example, some 20 different comparison operations). It has some peculiarities that relate to its IBM mainframe heritage (it uses the | character both as a pipe symbol, à la Unix, and as the non-exclusive OR), and some things that are just plain weird (the PARSE command

allows commas between arguments in a subroutine, but not in the main program).

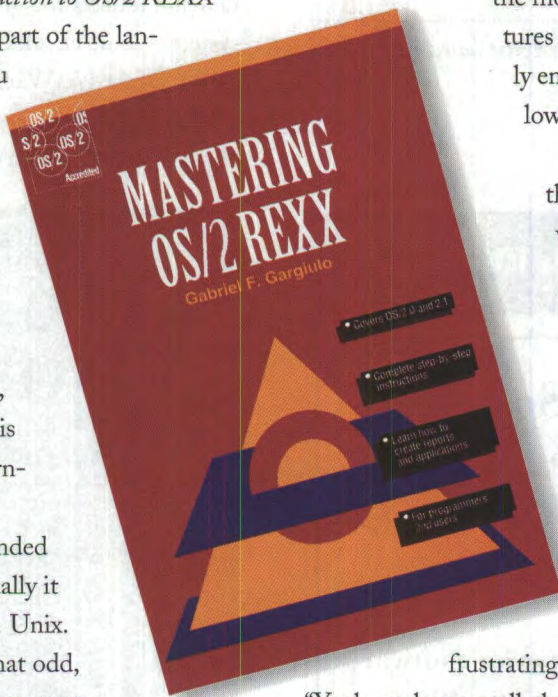
Gargiulo’s book provides an overview of OS/2 REXX, shows you how to start and run a REXX session, and describes some of the most commonly used commands and features of REXX. All of this is explained clearly enough that even an OS/2 novice can follow along.

My biggest problem with the book is that it doesn’t do a good job of showing what you can *do* with REXX. It contains lots of short little REXX programs, but almost all of them serve only to illustrate the syntax of specific commands. By contrast, books on MS-DOS batch file programming usually have you writing useful, if simple, programs in just a few pages.

Strong REXX partisans (such as myself) will find this book frustrating to read. As I went along I kept going “Yeah, yeah, now tell them about the *good* stuff they can do with REXX.” Perhaps that’s an unfair expectation about a book so obviously slanted to beginners. But there is so much you can do in REXX that is just plain not covered.

One of the strengths of REXX is that you can write a REXX program to run an application, take the output, operate on it, and store or display it. For example, it is not that hard to use REXX and an OS/2 communications program to write a powerful custom E-mail handler. There is barely a hint in this book that such a thing is even possible.

The book suffers from too little coverage of debugging. There’s





## BOOKSTAX

almost nothing on debugging strategies, common pitfalls in REXX, or other things a beginning REXX programmer wants to know when an early effort goes south. The chapter on debugging is seven-plus pages long, and one of those is taken up with a listing of error codes. The chapter on the trace facilities is more extensive, but it concentrates on the options for the trace command and doesn't give much guidance on when each is best used.

There are also some oddities. For instance, in discussing the PARSE command, the author habitually uses PARSE UPPER in the examples, which converts the parsed text to upper case. Why? For no reason I can discern.

My high expectations and its peculiarities aside, if you take this book for what it is, you probably will not be disappointed. It will get you started in REXX and guide you through the elementary operations of the language. On that basis it's a useful volume. ♦

*Rick Cook is a computer journalist and novelist based in Phoenix, Arizona.*

## CONNECTIVITY

*continued from page 57*

that they're using it enough to feel that they have to have network access for it. Turner also said he's noticed a very high proportion of developers using the new client. He says he believes this indicates strong development for OS/2 applications. "OS/2 has really caught fire over the last six months."

And, Turner noted, more features are still to come for the new OS/2 product. Soon to be released for OS/2 is support for TCP/IP and SNMP (the Simple Network Management Protocol, a standard for network management software). Turner says that NetWare Directory Services for OS/2 will also be released shortly.

"This is primarily enabling technology," Turner said. In his view, the existence of the NetWare Client for OS/2 will encourage much more development of both workstation applications and client/server software. He also said he thinks that part of the demand reflects the growth in 32-bit computers and operating systems—but, he added, so far that growth is visible only with OS/2. Of the NetWare Client for Windows NT, which is available on NetWare in pre-release form, Turner said the demand is "not even close" to the demand for the OS/2 software. ♦

### An Image Can Be Worth 1000 Hours

#### Use Imaging Technology to:

Eliminate Key Data-Entry  
Increase Throughput  
6 Month ROI  
Improve Data Quality  
Increase Accuracy

#### Solution Technology Provides:

Superior Software  
Consulting  
System Integration

**Result:**  
**Operator Productivity Increase 3x**

#### Solution Technology, Inc.

1101 S. Rogers Circle, Building 14 • Boca Raton, FL 33487  
Phone: (407) 241-3210 • Fax: (407) 997-6518

## SEND YOUR OS/2 PROBLEMS TO SCHOOL.

Our instructors encourage students to bring actual installation, configuration, networking, and programming assignments to class. Because they're committed to providing a real-life learning experience...experience that makes users, network administrators, and programmers more productive-immediately.

SysEd's OS/2 curriculum consists of a complete range of 13 courses. They are intended for highly motivated individuals who want to become OS/2 professionals and are willing to work hard. Our intensive training provides state-of-the-art instruction; a solid foundation in OS/2 facilities and integrated operating systems (OS/2-DOS, WIN-OS/2) and insights into advanced topics such as REXX (SAA language and Visual), CM/2, DB2/2, LAN Server, TCP/IP, CSET++, and OS/2 Presentation Manager Programming.

Public Classes are held regularly at SysEd's fully equipped classroom/computer facilities in New York City and in major American cities. Class size is limited to 10 students. Customized course offerings are available for on-site sessions at company installations. For more information, call David Shapiro at (212) 564-9147, 48, 49 or FAX: 212-967-3498.

# SYS-ED®

35 West 35th Street, New York, NY 10001



## INPUT

*continued from page 62*

two manuals complement one another well and still make a fairly compact set.

I agree with Pournelle about on-line documentation not being an adequate complete substitute for hard copy documentation, but in the situation he described the on-line docs were accessible. It appears he had a problem finding the correct document. Perhaps the organization of the on-line documentation is an area that IBM should explore and improve.

**Christopher H. Myers**  
Akron, Ohio

### Philippe Kahn: what he said

I eagerly awaited the March issue because of your interview with Philippe Kahn, CEO of Borland International [Q&A].

I was disappointed by his claims of commitment to Quattro Pro and other Borland applications when this is clearly not so. The Times-Picayune, the daily newspaper in New Orleans, reported that Borland is selling the Quattro Pro spreadsheet application to Novell, Inc. for \$145 million. I thought Kahn had dispelled the rumors of Borland's acquisition by another vendor, namely, WordPerfect, Inc. I realize Quattro Pro is but one product, but how long until the rest of Borland goes to Novell, Inc.? Kahn had shown interest in the development of OS/2 applications, although mostly work-for-hires: Borland C++, Object Vision, and possibly Paradox for OS/2. Now, with Novell's acquisition of Quattro Pro, coupled with their own operating systems, Unix and Novell DOS 7, how can we expect a commitment—and not

excuses like those from WordPerfect—from Kahn and Novell toward the development of OS/2 applications?

If we are not careful, it's just a matter of time before Microsoft buys Novell, Inc. Then we are all in trouble.

**Mark C. Chauvin**  
New Orleans, Louisiana

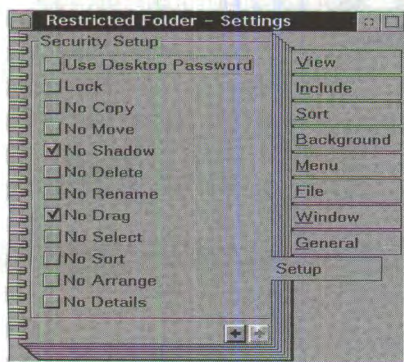
In your interview with Philippe Kahn [Q&A, March], I would have to agree with Edwin Black that an OS/2 32-bit Paradox would also have me standing in line for a copy. I use both the DOS and Windows versions, but an OS/2 version would be stupendous.

**Ralph Crosswhite**  
Kingman, Arizona

**The cost of independence**  
OK. You've convinced me. My

*continued on page 68*

### THE SECURE WORKPLACE for OS/2



No need to worry about what your users will do to the desktop you spent so much time configuring. Now you can protect, setup, and support your OS/2 desktop while reducing support time and costs.

You can set objects to a locked condition. Once locked, unauthorized users cannot move, copy, delete, shadow, or rename them. A locked object prevents users from changing its settings. Additional pages in each Settings notebook give you extended access to the Workplace Shell.

With security folders, you can lock away and password protect workplace objects you do not want users to access.



**SYNTEGRATION**  
13241 Norton Avenue  
Chino, CA 91710

Tel: (909) 464-9450

**Only \$59.95**

Site Licenses Available  
Visa, MC & Discover



**Available and Ready™**  
for OS/2

# TCP/2™

TCP/IP FOR OS/2

**Supports all released versions of OS/2  
including 32bit API for OS/2 2.0 and above**

**Our customers  
say our tcp/ip is the best.  
It's faster, more reliable,  
and more complete.  
Find out for yourself!**

A DAN LANCIANI PRODUCT

For further information contact: Essex Systems, Inc.  
One Central Street • Middleton, MA 01949

**(508) 750-6200**

Circle #101

TCP/2 is a trademark of DLD Consulting. Ethernet is a trademark of Xerox Corporation. OS/2 is a registered trademark of International Business Machines Corporation. VT102 is registered trademark of Digital Equipment Corporation. TCP/2 is based in part on work done by the University of California Berkeley.

**Available through OS/2 EXPRESS**

Available through OS/2 EXPRESS

Circle #197



## INPUT

Quicken check is written for my paid subscription to *OS/2 Professional*. It's too good to think of doing without.

Pay for independence? You bet I will. Otherwise, you pay more dearly for dependence, as those who have followed the Ziff-Davis slide into serfdom can verify.

**Michael S. Lundy**  
via CompuServe

### Bias against DeScribe?

Please explain your editorial bias against DeScribe, the only native OS/2 word processor on the market. Your unwillingness to accept—and champion—DeScribe as a formidable, top-notch product is blatant and smacks of a predisposition towards software that purchases and occupies *OS/2 Professional* advertising space.

Two articles in the March issue—

“The Current State of OS/2 Word Processing” [Hands On] and “Ami Pro: A Need for Speed” [DOT EXE] show the utter ignorance of the authors. Inordinate space is wasted bemoaning the lack of a decent OS/2 word processor and even more space is dedicated to Lotus's port of Ami Pro—a product which, by your own admission, is slow and not-ready-for-prime-time. It's just around the corner, the next release will address all the problems in the current product, and so on and so on. The ultimate insult was your selection of WordPerfect for OS/2 as “The Product of the Year”. Get real! Did anyone who voted for WordPerfect take the time to even use this bloated software port? That selection, along with the subsequent Ashton interview, helped to demonstrate your fact-finding

ineptitude and desire to buddy up with the big guys.

**Scott McDonell**  
Ogden, Utah

*Opinions clearly differ about OS/2 word processors. In fact though, the award WordPerfect 5.2 for OS/2 received was not ours—it was the Reader's Choice award, determined by our reader's votes.—*  
**Alan Kay** ♦

Letters to our Input section can be sent by fax (to 301-770-7062) or mail (addressed to *Input*, *OS/2 Professional*, 172 Rollins Ave., Rockville, MD 20852). Letters should be signed, on letterhead, contain your telephone number and be no longer than two-double-spaced pages. Letters can also be submitted by e-mail to one of the *Input* addresses found on page 9. Please indicate in your e-mail where you live and how we can reach you by phone. All letters, by whatever means submitted, become the property of *OS/2 Professional* and will be edited for length, content, and clarity. We cannot reply individually to Input letters.

ENTER OUR  
DAILY RAFFLES TO WIN  
FREE PRODUCTS

# OS/2 EXPRESS comes to PC Expo New York

**Stop by the OS/2 EXPRESS booth (567) to order the following popular OS/2 software at special show rate discounts:**

- ◆ *SoftTouch* / *GammaTech* for OS/2
- ◆ *MSR Development* / *BackMaster*
- ◆ *SofNet* / *FaxWorks* for OS/2
- ◆ *Clear & Simple* / *Performance 2.1*
- ◆ *J & J Computer Consulting* / *J & J Utilities* for OS/2
- ◆ *Van Nostrand* / *The best-selling OS/2 books*
- ◆ *HockWare* / *VisPro/REXX Gold & VisPro/REXX Bronze*
- ◆ *OnDemand* / *Pegasus Resource Monitor* for OS/2

June 28-30

All OS/2 EXPRESS inventory will be available as well. All orders 2-day delivery.







## DATA DATES

*Seminars, Conventions, Expositions, and Conferences for the OS/2 Professional*

### JULY 13-15

#### COMDEX/CANADA '94

##### Toronto, Canada

This year's COMDEX/Canada, Canada's largest computer conference, will be joined by the LANExpo Program and the Windows World Program. The combined events are expected to attract 40,000 computing professionals and corporate managers who will view and discuss the hardware, software, and services of more than 450 exhibiting companies. Scores of sessions focusing on the technology and strategies necessary to realize the business goals of the 1990s will be offered. Among the special events at this year's COMDEX/Canada will be seven intensive three-hour sessions, called Quick Start Tutorials, offering in-depth training in client/server, objects, Windows, workgroups, LANs, the Canadian Internet, and Electronic Data Interchange systems. Bill Gates, chairman and CEO of Microsoft Corporation, and John Edwards, executive vice president and general manager of the Appware Systems Group of Novell, Inc., will deliver the keynote addresses. Registration fees for the conference, tutorials, and exhibits are C\$325 for all three days or C\$250 for one day. Any single program is C\$250 for all three days or C\$150 for one day. The

Quick Start Tutorials are C\$125 each. Contact: The Interface Group, (617) 449-6600.

### JULY 19-22

#### OS/2 WORLD CONFERENCE & EXPOSITION

##### Santa Clara, CA

The first annual OS/2 World Conference & Exposition, produced by Miller Freeman, Inc., is an independent technical program designed specifically for the OS/2 user. The program will feature more than 100 lectures, workshops, and tutorials. The technical program, broken into eight tracks, will focus on OS/2 networking, corporate software development, client/server and information management, and more. Faculty for this event include OS/2 experts David Moskowitz, Matt Trask, and Mark Minasi, among others. The keynote address will be delivered by Stewart Alsop, editor-in-chief of *InfoWorld*. The accompanying exhibition will feature leading industry suppliers showcasing what's new in application software, communications hardware and software, databases, network solutions, multimedia tools, and more.

Registration is \$795; multiple group rates are available. Optional one-day tutorials cost \$295. Contact: Miller Freeman, (415) 905-2354.

### SEPTEMBER 11-14

#### OS/2 TECHNICAL UPDATE/NETWORLD INTEROP

##### Atlanta, GA

IBM PSP and Ziff-Davis Expositions will premiere the first of their interchange style meetings, OS/2 Technical Update, running concurrently with NetWorld+Interop Conference and Exposition. The merger will allow IBM PSP to reach an even broader audience of OS/2 and LAN systems professionals. This event will include technical sessions, workshops, demonstrations, and the latest products, developments, and strategies for software developers and networking and enterprising experts. This will be the first of several similar meetings; future locations will include London, Toronto, and Phoenix.

A highlight of this event will be the second annual *OS/2 Professional Awards Ceremony*, honoring top developers, programs, and people in the OS/2 industry. Edwin Black, publisher and editor-in-chief of *OS/2 Professional*, and Bradley Kliever, editor, will host the event on the opening night of the conference.

Early bird rates are available prior to July 27 at a cost of \$800 for a full conference package that includes entry to the NetWorld+Interop exhibit

hall. After July 27, the cost rises to \$895 with one day conference packages at \$400. Cross-over packages are available for \$995 before July 27 and \$1,095 thereafter. The cross-over package allows registrants to attend conferences and sessions at both the OS/2 Technical Update and NetWorld+Interop. Contact: ZD Expo, (800) 636-6634.

### SEPTEMBER 20-22

#### NETWORKS EXPO

##### Dallas, TX

Networks Expo Dallas, produced by Bruno Blenheim Inc., will focus on how to use the latest in networking technology. A highlight of the event will be the CNEPA Lab workshops, which will provide technical instruction on server design, internal user support, NetWare services, and more. In addition, hundreds of companies will showcase their latest computer networking hardware and software products. Contact: BBI, (800) 829-3976. ♦

*Send meeting & conference notices to Data Dates, OS/2 Professional, 172 Rollins Ave., Rockville, MD 20852.*

*Fax: (301) 770-7062*

*Compuserve: 73740,2661*

*MCI Mail: 310-3946*





# Dream On

BY JERRY POURNELLE

I had a great dream the other night. I answered the door bell to find among the usual pile of stuff on the porch a bunch of boxes from IBM. One was huge, and there was a letter attached.

"Dear Jerry, Inside you'll find a replacement Value Point Pentium. This one has OS/2 2.1c pre-installed with the latest video drivers. We're shipping them all that way now. Please remove your network and sound cards from your old machine and install them in this one. You'll find that easy because we have included a setup program and drivers for most sound and Ethernet cards. When you get all your stuff out of the old machine, please use this crate to return it."

There was more. The new OS/2 was configured to let me install Windows for Workgroups in place of WIN-OS/2. I didn't really have to do that, though, because the new OS/2 had IBM-Talk, a new medium performance LAN that would connect two OS/2 machines or connect as a client to OS/2 Net Server, just like Apple and Windows for Workgroups systems.

By then I was pretty sure I was dreaming, but I didn't want to wake up. There was another box on the porch, this one a bit smaller. When I opened it I found a new IBM laptop. It had a mini-version of OS/2 pre-installed, and even the mini-version had the capability to work with Trantor's little parallel port Ethernet so it was no trouble at all loading it up with programs and data. Since it was a laptop it had limits on the number of windows I could leave open, but since it had OS/2 in ROM I had no problems running communications in background while I used the laptop to write up the day's journal. I was happily thinking of where I'd show it off ... Then I woke up to reality.

A few weeks ago I went to England for the International Con-

ference on Technology in Education where Mrs. Pournelle was presenting a paper. Alas, although there was plenty of Windows as well as Apple, there was no mention of OS/2 at the conference. Then we went to a computer show at the National Exposition Center near Birmingham. It's a wonderful way to go to a computer show: take a train from London, ride for an hour through really beautiful country, then walk from the station to the exposition center.

IBM had the two largest booths at the show. One was devoted to OS/2 and featured the best computer products pitch man

I've seen since watching Gary Saxer do X/Windows. There was a lively crowd, and considerable interest in OS/2. The other IBM booth sold IBM computers and software. Here's an example: "IBM introduces PS/1 Easy Office: PS/1 Minitower with security key lock; i486DX 33mhz; 4mb of RAM, 253mb hard file; SVGA multiscanning monitor; DOS 6.0, Windows 3.1, Works 2.0 for Windows, Quicken UK for Windows ..."

In fact, not one single machine at the IBM hardware booth came with an option of OS/2 pre-installed. No

demonstration machines in the IBM hardware booth were running OS/2. If any of the hardware sales people were pitching OS/2, I didn't hear them. It was as if the two IBM booths were owned by two different companies. In fact, it seemed like the hardware company didn't even like the OS/2 people.

This doesn't inspire confidence. I often think I have more enthusiasm for OS/2 than the IBM hardware outfits do. If IBM won't ship machines with OS/2 pre-installed, just who is going to do it?

I think I'll go to bed and try to repeat that dream. ♦





# 1,200+ Programs!

- Shareware
- Demoware
- Tips
- Freeware
- Stupid Tricks
- Resources



## \$25

plus \$4 shipping & handling

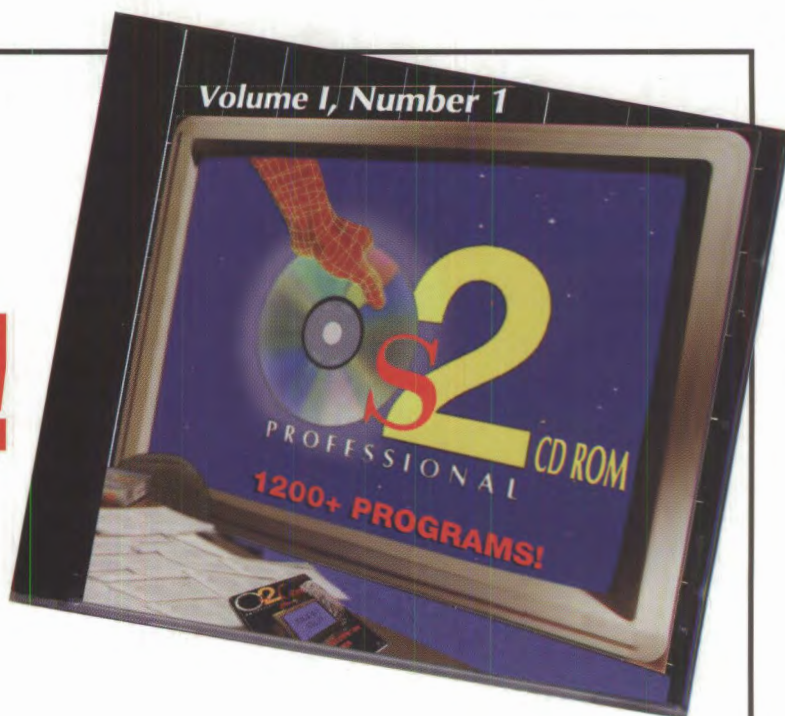
**1-800-OS2-KWIK**

**OS/2 Express**

Or fax your order to:

**(301) 770-1720**

**OS/2 CD-ROM**  
PROFESSIONAL



### Your Roadmap to the OS/2 Multithreading Superhighway...

*More than 1,200 OS/2 shareware, freeware, and demoware programs and tools, as well as scores of important OS/2 resources, are now assembled on the OS/2 Professional CD-ROM.*

*An object-oriented WPS Application puts program installation and information access just one click away.*

*Arranged with colorful graphics, the OS/2 Professional CD-ROM is the must library for developers, Team OS/2ers, and anyone else interested in the diversity of OS/2 software.*

*Volume I, number 1 is only the beginning. Collect them all.*

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

FAX \_\_\_\_\_

Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Voice Phone \_\_\_\_\_

Billing information

☐ VISA ☐ MasterCard ☐ Check enclosed \$ \_\_\_\_\_ Amount

Card Number \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_



# COREL DRAW!™

The Best in Graphics  
For OS/2

# THE Power TO DO IT All!



CorelDRAW 2.5 for IBM OS/2 contains easy-to-use CorelDRAW, CorelCHART and Corel PHOTO-PAINT — all in one value-packed box. There's no need to buy any other software packages. CorelDRAW gives you the power to do it all!

CorelDRAW is a 32-bit illustration software program, specifically developed for OS/2, that takes full advantage of the power and threading capabilities of OS/2 version 2.0. Now you can easily create effective slides, flyers, brochures, newsletters, creative designs and technical illustrations — up to 25% faster than ever before.



**Corporate, Government and Education Services**  
Contact the Egghead Account Representative for your state at:

AL, AR, HI, IL, IN, KS, KY, LA, MS, MT, NC, ND, NE, NM, NY, OH, OK, SC, SD, TN, TX, WV, WY 1-800-347-6400	CT, MA, ME, NH, NY, RI, VT 1-800-359-8519
AZ, CO, OR, WA 1-800-725-3447	IL, IN, MI, MO, WI 1-800-688-5147
AK, CT, UT 1-800-659-3447	FL, GA 1-800-745-3447
CA 1-800-785-3447	DE, NJ, PA 1-800-829-9490
IA, CA 1-800-487-4244	DC, MD, VA 1-800-785-4244
TX 1-800-787-4242	HI 1-800-526-2514

**EGGHEAD SOFTWARE**

All this, plus a bonus CD-ROM disc with over 14,000 clipart images and over 250 fonts, makes CorelDRAW the "Complete Graphics Solution" for OS/2 users.

